

### Indian Agricultural Research Institute, New Delhi

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# AGRICULTURAL GAZETTE

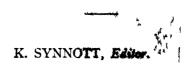
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#### NEW SOUTH WALES.

Issued by Direction of

The Hon. W. F. DUNN, M.L.A.

MINISTER FOR AGRICULTURE AND FORESTS.



By Anthority:

SYDNEY: ALFRED HENRY PETTIFER, ACTING GOVERNMENT PRINTER

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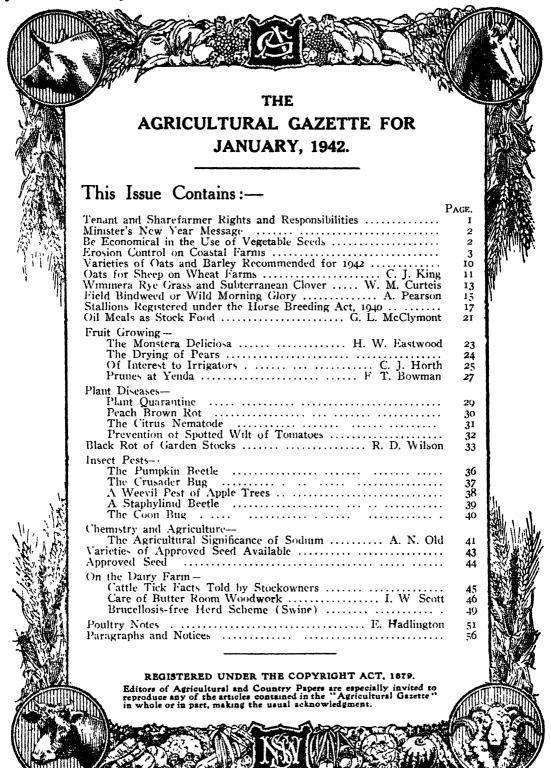
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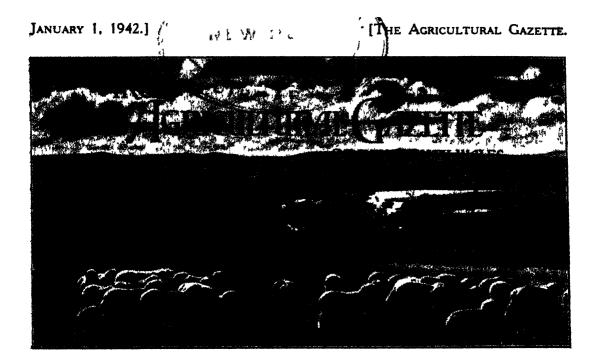
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The Agricultural Gazette.

January, 1942.

### TENANT AND SHAREFARMER RIGHTS AND RESPONSIBILITIES.

THE Agricultural Holdings Act, 1941, to which reference was made in the November issue, has now passed through all stages in Parliament and will be proclaimed in the near future. The need for improved landlord-tenant relationships, as reflected in farm management, is generally admitted and it is hoped that the passing of the Act will mark the commencement of a new era, not only in such relationships but in the standards of farming adopted by tenants and sharefarmers.

For many years tenant farmers have complained that they were unable to adopt modern methods or to effect improvements to their rented holdings because of the attitude of landlords in withholding compensation. In these matters their interests are now fully protected and tenant farmers can no longer blame the landlords should they be criticised for slovenly, exploitative methods of farming.

#### Copies of Act Available.

It is essential that tenants and share-farmers be aware of their rights and responsibilities under the Act, especially as regards such matters as compensation for improvements, compensation for disturbance of tenure, arbitration as to the rent to be paid for a holding and the procedure to be followed in cases where disputes arise. Landlords also have certain rights and obligations under the Act, and it will be necessary for them to be informed as to its provisions. Copies of the Act are now available and are obtainable from the Government Printer, Phillip-street, Sydney; price Is.

#### Three Classes of Improvements.

For the guidance of all interested parties, it may be stated that the Agricultural Holdings Act is not a warrant for tenants and sharefarmers to effect any improvement that may appeal to them as desirable regardless of cost and utility. Improvements are in three categories, viz., those that may be carried out without prior reference to the landlord, those which must be referred to the landlord and to which he may dissent and require the matter to be referred to arbitration, and those which must be referred to the landlord and which he may decide to carry out himself, but to which he cannot dissent.

#### Good Farming Encouraged.

The improvements which may be effected without reference to the landlord are in the main concerned with ordinary farm practices and include items such as the use of lime and fertilisers, subdivision fences, the laying down of permanent pastures. Tenants may claim compensation for the unexhausted

#### Minister's New Year Message.

To all and every one I send my very good wishes.

We have all had a hard year; each of us from day to day hardly knowing how he was going to overcome the problems that faced him. Yet somehow these problems have been overcome. Whilst all sections of the community have shown a great spirit in meeting the changing times, I have no hesitation in expressing my admiration of the part played by primary producers in carrying on their industries, despite adverse weather conditions and shrinking export markets.

Working in loneliness, supported only by your own courage, and daily having to undertake the extra toil of heavy work through the absence of your young men who have gone abroad to fight for the protection of their country, you have yet garnered the harvest that assures daily bread to all the community.

Knowing your courage and resource, I know that you will continue to plough the furrow and produce the foodstuffs that play such a major part in ensuring victory and with it peace and goodwill for our people.

I send to you all, my greetings and my good wishes for 1942.

W. F. DUNN,

Minister for Agriculture and Forests.

values of these items at the termination of tenancy. The landlord may object to items such as the construction of silos, irrigation works, land drainage and the clearing of trees, but it would be necessary for him to prove that such improvements were not warranted.

#### Two Years Minimum Tenancy.

Tenants and landlords will be interested to know that future agricultural tenancies are to be for a minimum period of two years. To terminate a tenancy not less than one year's nor more than two years' notice must be given by either party. Should the landlord terminate the tenancy for reasons other than failure on the part of the tenant to comply with certain obligations, the tenant is entitled to compensation for disturbance except in cases where the original agreement provides for a term of not less than five years. Compensation for disturbance will in most cases be an amount equal to one year's rent of the holding.

#### Familiarise Yourself with the Act.

The foregoing remarks serve to illustrate a few of the principal features of the Act. At the same time they indicate the need for landlords and tenants to familiarise themselves with its provisions. Whilst the Department hopes that landlords and tenants will recognise that their interests are mutual and that they will gradually evolve a new system which will be beneficial not only to themselves, but to the State, it is realised that some disputes are inevitable. The Act provides for the constitution of agricultural committees to arbitrate when disputes arise. In proceedings before these committees the appearance of members of the legal professions is expressly forbidden.

#### Departmental Officers Can Advise You.

Field officers of the Department located in country centres have been supplied with copies of the Act, and farmers should take the opportunity to consult them before the Act is proclaimed.

A guide to the Act in non-legal terms is in course of preparation and will be available in the near future.

#### Be Economical in the Use of Vegetable Seeds.

At the present time the bulk of the vegetable seed used in New South Wales, and for that matter in Australia, is imported from overseas, namely from U.S.A. Owing to the war situation and other factors it is probable that there will be a serious shortage of seed

of vegetables, states Mr. A. H. E. McDonald, Chief of the Division of Plant Industry of the Department of Agriculture. In order to safeguard as far as possible against such a contingency, the Department urges vegetable (Continued on page 16.)

#### EROSION CONTROL ON COASTAL FARMS.

#### A Problem of Soil Protection and Fertility Maintenance.

ALTHOUGH the average annual rainfall (up to 60 or 70 inches or more in places, with daily registrations reaching sometimes as high as 10 inches) in coastal districts, is much higher than that in other parts of the State, soil erosion generally causes less concern than in other districts. The main reason for this apparent anomaly is that the heavy rainfall keeps a more constant cover of growth on the soil, and this serves as a protection.

There is no doubt, however, that when coastal soils on slopes are bared to this rainfall, they are subject to erosion. With the heavier rainfall, there is a relatively great and rapid decomposition and destruction of organic matter in the soil, and there is thus a great need for its speedy and frequent replenishment to maintain the moisture holding capacity of the soil and its capacity to resist erosion when under cultivation.

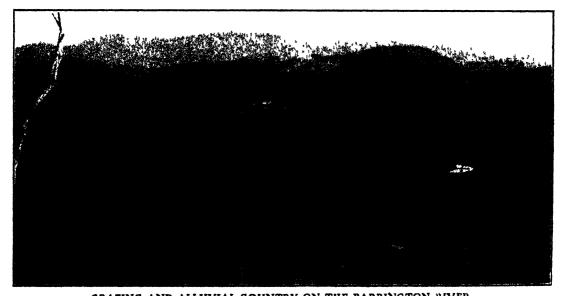
The fundamental principles to be observed in the control of soil erosion in these coastal regions do not differ from those enunciated for other districts, viz.: (1) protection of the soil by keeping as much cover on it as possible; and (2) when it has to be exposed by cultivation, to maintain in it a high content of organic matter.

On pasture land, observance of the first principle means that the pasture cover should be maintained as thickly as possible. This is accomplished by avoidance of overstocking, production and storage of fodder to enable conservation of the pastures at critical periods, subdivision and rotational grazing, top-dressing and even distribution of animal manure by harrowing—in short, all the management which goes to make up good husbandry.

On cultivation land, the fundamental consideration is that the land should not, for too long a period, be under an intensive system of

cultivation or cropping, which is highly destructive of organic matter.

It is generally possible to alternate pasture and cultivation quite well to the benefit of each under good management on a coastal farm, but if for the sake of very great convenience or for some reason beyond control, it is necessary or desirable to retain a cultivation paddock for a long period, it can only be done wisely by some means of maintaining its organic matter at a high level. This is also a matter of good farming practice, on which the control of soil erosion on sloping lands in coastal districts depends just as much as is the case elsewhere.



GRAZING AND ALLUVIAL COUNTRY ON THE BARRINGTON RIVER.

Establishment of all-the-year round pastures on the hill country assists in soil erosion control and builds up fertility.

#### The Far North Coast.

#### Cultural Methods and Pasture Management in High Rainfall Areas.

G. GILES, Agricultural Instructor.

THE high rainfall in this district (the average rainfall in the various centres being from 35 to over 60 inches per annum, with falls frequently exceeding 6 inches in twenty-four hours, and 20 inches in a month) makes erosion a natural corollary of cultivation and removal of surface covering on sloping lands.

In the Richmond, Tweed and Upper Clarence

watersheds, the major soil types and consequently erosion problems, fall naturally under three head-

(a) Volcanic soils of a porous nature, mainly under paspalum pastures, which are the source of the greater portion of the butter output in the district;

(b) River and creek flats, usually devoted to crops and paspalum pastures; the chief

cropping areas of the district;
(c) Soils of slate, shale, and sandstone derivation, carrying mainly native grasses and only cropped to a very limited extent. These soils generally consist of a poor shallow surface soil with an inferior subsoil. The bottoms of the gullies in this area usually carry a dense sward of paspalum.

#### Volcanic Soils.

Volcanic soils in their natural state are heavily It is notetimbered with dense undergrowth. worthy that, under these condtions, these scrubs and jungles have very little run-off. On clearing, springs break out and running streams become more permanent. This type of country grasses readily with paspalum, kikuyu, and Rhodes grasses, forming dense swards with a limited surface run-off.

These soils, when cultivated, tend to resist erosion while plentifully supplied with fibrous organic matter, such as old paspalum residues, but with the rapid breakdown of this material under the sub-tropical climatic conditions experienced, become very subject to erosion with continued cultivation.

A large amount of loss has already occurred in these soils, particularly those paddocks which in the period 1880-1910 were devoted to the pro-duction of sugar cane for milling, and also sloping areas which have been cultivated for an extended period without due precautions being taken to prevent washing. This loss, owing to the extremely deep nature of the soil, and the absence of a defined subsoil, is often not very apparent to the casual observer, but is reflected in the decreased vigour of growth of crops and of the subsequent paspalum pastures which usually follow cropping.

A noteworthy example is an area which was cleared and planted to bananas some ten years ago. The bananas were eliminated by disease five years ago, and the area subsequently cropped with beans and other vegetables.

Considerable erosion and gullying has taken place on a I in 3 slope, but owing to the great depth of good soil, the immediate productive power has been impaired gradually, although the potential value of this area has been definitely lowered by the erosion of one of the richest and deepest soils in the district and the area which can be worked reduced by the extension of gullying. It is anticipated that in another ten years the intensive use of this area will have become uneconomic .

#### River and Creek Flats.

These areas, being of a level nature, are not particularly subject to surface erosion, although streambank damage is common.

On the higher reaches of these fast-flowing streams the practice of planting willows and similar trees on the banks and then cultivating the flats, often results in damage to these cultivation areas, as in the frequent floods, debris is piled against the trees, forming dams, which are capable of causing a diversion of the actual stream bed to a new site across the flats. As these creek flats are vital to the success of dairy farming among the steep hills, such diversions cause a severe loss of valuable cultivation land.

On the slow-flowing navigable reaches of the main rivers, river bank crosion is mainly the result of wave lapping, and is controlled by stoning the banks and establishing trees. Work of this nature has been extensive in the various parts of the district as a result of the efforts of the local

Shire Councils.

#### Soils Derived from Sedimentary Rocks.

These soils, where too poor for paspalum growth, are grassed with native species which have a tussock habit of growth; this fact, together with unwise clearing in many parts and annual burning off, has given rise to considerable erosion in some areas.

Most of this land is too poor for cultivation, and even where it has to be used, it will only grow satisfactory crops for a limited period of years, unless maintained with green manures and protected from erosion.

This erosion, which in some cases has reached the "deep gully" stage, is particularly serious in these areas as the effects are cumulative, and as the surface soil on the undulating areas is often only a few inches deep, not only is the growth of the present pastures being gradually reduced, but the problem of replacing the native grasses with improved types, such as paspalum and Rhodes, is rendered more difficult.

It is noteworthy that in the depressions where silt has accumulated, the dominant grass is a dense sward of paspalum, which greatly reduces the erosion on such areas.

#### Wind Erosion.

The vegetative covering throughout the district is more than sufficient to prevent wind erosion, except in the sand dune area along the coast.

On soil that will grow them, the establishment of kikuyu, Rhodes, paspalum and carpet grass pastures provides a sward which reduces erosion to a minimum.

#### Control of Erosion.

On those areas which will not satisfactorily grow grass, the re-establishment of forest trees, lantana, and undergrowth provides soil-binding cover. The encouragement of natural reafforestation and undergrowth on ridge caps will reduce the damage which may be occurring on the more open native grass slopes.

#### On Cultivation Areas.

On cultivation areas the ravages of erosion may be checked by maintaining a high content of fibrous organic matter in the soil. This is achieved

Ploughing under green manures and crop residues and breaking up sod-bound areas for culti-

vation

Frequent changing of cultivation areas (this is limited by the availability of suitable land), as continued cultivation rapidly destroys the texture of the soil and encourages erosion, particularly on the lighter soils of volcanic origin

Maintenance of surface cover of either weeds or cover crops rather than a clean fallowed condition in order to prevent sheet erosion. The value of a clean fallow in an area of high rainfall and high temperature with consequent rapid nitrification, is open to question in comparison with a cover crop, particularly green manure with its greater erosion control.

Sow all row crops across the slope. Although obviously preferable, it is remarkable how often this is not practised, greater consideration being given to the easier working of up and down rows.

Diversion of running water by drains, so that it will not run across the cultivation areas.

#### The Importance of Slope in Cultivation Land.

The question of the degree of slope is of paramount importance, but in this district where the bulk of land is from undulating to steep, the degree of slope to cultivate cannot be defined, as

some cultivation is essential for economic dairy farming. Some farms exist where even to grow a little fodder cane, a slope really steeper than advisable must be utilised, even at a risk of soil Factors which must be considered in deciding the limitations of a slope for cropping are:-

- (I) Soil Texture.—The more open the soil and subsoil, the greater the slope which can be uti-
- (2) Soil Condition—The presence of large amounts of fibrous material acts as a check on erosion; thus land broken up from paspalum sod will suffer much smaller losses of soil in its first year of cultivation than in subsequent years. The amount of erosion rapidly increases on sloping areas with continued cropping and cultivation.
- (3) Location.—The amount of run-off from higher areas and roads is often a limiting factor.
- (4) The Economic Aspects.—These are of great importance For instance, the gross return from the I in 3 sloped land mentioned earlier would be in excess of £500 for the past ten years, and the rent collected by the owner between £20 and £25 per acre for the ten years. Although the national asset, the soil, is being reduced, its economic contribution to production outweighs the loss, especially as, after a period of years under lantana and similar growth, this land will be again suitable for use, even if not as fertile as in the original virgin state.

Erosion control on the steeper slopes where land is sufficiently fertile is a matter of planting kikuyu grass in gullies, on steep hillsides, among rocks, etc. This grass has particularly valuable soil-binding properties as well as a high economic

Where cultivation is the primary factor, the use of buffalo grass is preferable to kikuyu, as not only has it excellent soil-binding ability, but is far easier to control, although not as valuable from a grazing standpoint.

On those soils which under high rainfall reach a state of practically liquid mud and tend to flow bodily down the slope, the use of surface drains across the slope leading into grassed gulleys is of great value in preventing the loss of a com-plete sheet of surface soil. Unless this loss is prevented, many areas of steep land at present cultivated will be useless to the next generation

#### The Nambucca to the Clarence.

#### Pasture Cover to Protect and Hold the Soil.

W. H. DARRAGH, Senior Agricultural Instructor.

On the north coast areas from the Nambucca to the Clarence and including the Dorrigo, soil erosion is caused chiefly by water run-off after heavy rains, and by the flooding of streams and rivers.

On the Dorrigo Plateau and on the eastern fall (known as Eastern Dorrigo), the fall is very rapid, and since much timber has been cut out, erosion is very bad in parts. On the ranges between the Bellinger and the Nambucca rivers and between the Nambucca and the Macleay, the hills are steep and water run-off is very fast

The soil on these areas is second class and carries much bracken and blady grass, which help to stem erosion but do not provide fodder for dairy stock. Where the country has been opened up and a good grass cover obtained, erosion is

not so bad. When kikuyu grass is planted on steep country, its progress uphill is very slow, but the extension of the area downhill is fairly rapid.

In these areas and on the Dorrigo Plateau, serious gullying follows the cutting out of tracks by dairy stock, particularly near gateways and in lanes. The use of kikuyu grass around dairy yards has proved an active control of erosion. In wet weather dairy yards often become very



Deep Cattle Tracks in Red Laterite Soils at Dorrigo.

muddy and often are little better than a quagmire. Many instances can be cited where kikuyu grass has provided a good grass cover and has protected the yards from erosion.

The action of the curl grub in causing a loss of pasture cover and in loosening the soil has resulted in heavy soil washes.

The use of contour ploughing and cropping should be a permanent feature of Dorrigo agriculture.

On the Orara River, very good alluvial flats cannot be used for cultivation, owing to the possibility of crosion due to river flooding areas are sown to permanent pastures. Better results could be obtained by including red clover and lucerne in these pastures, and by the use of topdressing.

Areas like those of the Upper Clarence are very rugged, and erosion a normal process, no doubt accelerated by the thinning out of timber. Soil erosion control in these areas is a matter of establishing a good herbage cover by the use of superphosphate and clovers, rather than the use of mechanical means.

#### The Central North Coast.

### Use of Plant Cover and Contour Working.

J. M. PITT, Senior Agricultural Instructor.

The control, on the farm, of erosion caused by big floods, especially when the banks are broken, is almost beyond the capacity of humans. Still some preventive measures can be practised, more especially to hold banks, less steep, and where the current is not so swift. The planting of suitable trees, shrubs and other plants has given good results. The common reed, for instance, grows in salty or fresh water. It stools profusely, and through silt collecting in its midst, not only prevents erosion, but builds up areas. The ordinary mangrove, too, does remarkably good work in holding the foreshores along salty and brackish water frontages, as also does the lantana. In fresh water areas, kikuyu grass has a splendid binding effect and natural growing trees such as the ironwood, bottlebrush, willows, etc., especially where growing thickly, prevent erosion.

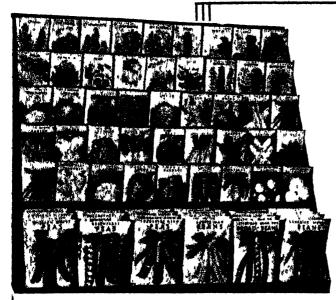
Trees should be planted though not too close to the edge, especially where the river breaks its banks, nor singly. Willow trees, coral trees and other varieties are useful for the purpose.

II is the opinion of officers of the New South Wales Department of Agriculture that the control of soil crosson on agricultural land is almost wholly an agricultural problem intimately related to good furning practice, in which the maintenance or improvement of soil fertility plays an important part

These articles by officers of the Division of Plant Industry located in coastal districts, constitute the third of a series on erosion control. In the issues for October and December of last year the problem as it affects the wheat areas was dealt with by officers resident in those areas.

To prevent further erosion in gullies, cow tracks, etc., branches of trees, brambles, logs, stones or other material can be used to stop the rush of water, and the planting of such places with kikuyu and other grasses as well as suitable trees or shrubs is also recommended.

On cultivated areas with even a gentle slope, preventive measures such as working in a contour instead of up and down the slope; refraining at all times from growing furrow crops up and down the slope; having strips unworked to prevent much flow of water; sowing the obvious water-courses with permanent crops; and diverting the flow of water into drains—such drains to be wide and shallow—are recommended.



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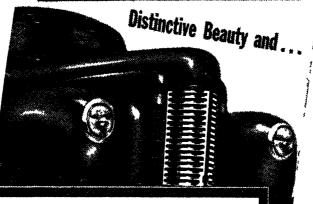
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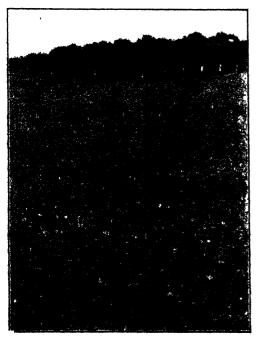
#### Maintain the Fertility of Central Coast Soils.

#### The First Essential in Erosion Control.

G. T. DAWSON, Agricultural Instructor.

Soil erosion is a major problem throughout the Hunter Valley and Central Coast. In the Upper Hunter area (especially the Jerry's Plains—Denman areas) much of the undulating country is quite bare of vegetation, the surface soil having been washed away. Gullying is also severe in these localities.

Control of this bad surface erosion is very difficult because in most instances the surface soil has been completely washed away. The trouble has been accentuated by indiscriminate clearing of all or most of the timber from the hill country, by rabbit infestation and by excessive overstocking. Fortunately the rabbit pest has now been brought under control on most properties.



Useful Shade and Shelter Camp on a Hill-top.

The pasture on the slope is Phalaris tuberosa.

Some measure of success has been obtained by fencing off these badly eroded hills and preventing any stock from grazing thereon for several years. In this way, vegetation is encouraged to grow on the areas where some surface soil remains, and this in time will spread to the denuded areas. It is really remarkable how these bare patches will ultimately become covered over again with vegetation, provided stock are kept away.

Where practicable it is a good plan to scatter Subterranean clover and Rhodes or Giant Panic grass with a top dressing of superphosphate at the rate of I cwt. per acre in the more favoured situations. These drought resistant pasture plants, once established, will spread and greatly assist in checking further erosion in the Upper Hunter, where the average annual rainfall is in the vicinity of 22 inches and much of it occurs as severe summer storms. Greater attention should also be paid to the planting of belts of trees.

#### Rotations for Cultivation Areas.

In areas nearer the coast, where the annual rainfall is much heavier (Maitland 33 inches, Dungog 37 inches, Bullahdelah 51 inches) severe damage is caused in undulating cultivation and pasture land by water erosion. In cultivation areas the chief cause of erosion is loss of soil fertility hrought on by continual cropping, in some cases for periods of over fifty years. The result is that the soil is lacking in water holding capacity, and when severe rainstorms occur surface crosion is general, and soon gutters appear all over the area.

The first essential therefore in the fight against soil erosion on Lower Hunter and Central Coast is to build up soil fertility. Paddocks that have been cropped with sorghum, maize, oats and other non-leguminous crops for several years, should be sown down to improved pasture in which clovers (Red, White or Subterranean according to the type of country) predominate. After the land has been under this pasture for three or four years cropping may be resumed again if desired. More attention, however, should be given to the inclusion of leguminous crops in rotation with maize, sorghum, etc. In the summer cow peas and soy beans have given very good results. A good plan is to sow them early (September), then cut them for fodder (or silage, especially when mixed with maize or sorghum for this purpose). This cutting will be completed in January, and the legumes then make a good re-growth, which can be ploughed into the soil about April. Some farmers have successfully planted cow peas (Poona and Black) in rows with their maize for silage. The peas creep up the maize stalks and are harvested with the maize for silage. Their growth in the soil helps to maintain soil fertility and also improves the fodder value of the silage.

Where lucerne can successfully he grown on undulating coastal country this crop should be used for grazing, as by this means the soil fertility is improved more than by cutting the crop for hay.

Winter fodder crops such as oats and wheat should be sown with vetches or field peas These legumes make splendid growth and help to improve the nutritive value of the fodder, which is generally cut and fed to stock during late winter and early spring (when it is needed most).

#### Contour Banks Help.

The construction of contour banks has proved quite successful in preventing soil erosion of undulating cultivation paddocks near Maitland. Two years ago Mr. S. H. Short, of Aberglasslyn, contour banked a large paddock which had begun to wash badly. The soil is of a dark, medium, loamy nature. Low contour banks were made across the slope, each one having a fall of 15 inches per 100 feet. This proved to be the most effective in carrying off all surplus water. The vertical drop between contours was never more than 4 feet. This meant that there were only short distances between contours, but this is essential under the comparatively heavy rainfall conditions.

Since constructing these banks Mr. Short has always ploughed the whole of his paddock on the contour, striking out each time along the crown of the contour bank, and finishing out in between contours. In this way the banks are reformed at each ploughing, and every plough furrow in the paddock acts as a miniature contour bank in holding water and preventing washing of soil. Very little difficulty has been experienced in planting crops such as maize, sorghum and oats on the contour system.

Erosion in the paddock has been completely arrested during the period since this work was put in hand. Had these steps not been taken it is probable that large gutters would now have been formed throughout the area and much valuable land lost to cultivation.

Very little water runs off this paddock per medium of the contours except when torrential rain falls in a short period, as the moisture is readily caught and held by the soil.

In addition to building up the soil fertility on undulating pasture land along the Central Coast and Lower Hunter (by liming where acidity is indicated), application of superphosphate, and sowing of clovers such as Subterranean, etc., the ploughing of furrows with a mouldboard plough across the slope, has proved very effective in preventing washing or gullying on grass lands. These furrows need only be made about every 8 feet of vertical fall, and should in themselves have a fall of about 15 inches in 100 feet.

#### PASTURES ANCHOR THE SOIL.

#### Legumes Build Fertility.

These are Vital Principles of Soil Conservation Measures on the Central Coast.

W. A. HORSLEY, Assistant Agrostologist.

DENSE turf absorbs rain and anchors the surface soil. Pasture improvement compacts the turf. Any practice which increases the density of the pasture sward limits surface run-off and retards soil erosion.

Extensive grazing encourages cattle tracks. The cattle tracks increase the velocity of the surface run-off and gullies are formed. When properties are subdivided into reasonably small paddocks, and the stock given proper "on" and "off" grazing, the movement of soil downhill is arrested. By encouraging suitable legumes (Subterranean, White, Ball and Suckling clover, and trefoils) with lime and superphosphate pastures are made

By encouraging suitable legumes (Subterranean, White, Ball and Suckling clover, and trefoils) with lime and superphosphate, pastures are made more palatable and nutritious. Cropping of hill soils of mediocre fertility, increases run-off and denudes the soil of its fertility. If crops are confined to the flats and alluvial soils, and pastures, improved with top-dressing and the introduction of exotic legumes, are maintained on the undulating hills, minimum erosion occurs.

Soil erosion control in the central and lower north coast district is largely a problem of maintaining soil fertility. The rotation of crops with legumes, particularly perennial legumes or annual regenerating legumes, appears to be a suitable means of preventing erosion on cultivation land. The legumes improve the soil chemically (nitrogen for more vigorous plant growth), physically (the built-up organic matter has a physical effect on the soil clay), and mechanically (the soil is covered and run-off prevented). Rotation of crops with lucerne, red clover or pasture appears to be the ideal practice for the coastal farmer.

Clumps of trees on the tops of hills not only retard the velocity of the rain to earth by the streaming action of the leaves and the accumulation of leaf litter, but provide warm shelter camps which protect the stock from bad weather. The cattle accumulate dung, where they camp; the seed in the dung and the fertility of the dung rapidly thicken the pasture sward on the hill tops and thereby bind the surface soil and retard erosion.

#### The Upper South Coast.

#### A Programme of Soil Erosion Control.

L. T. JUDD, Senior Agricultural Instructor.

WHILST mechanical aids may be of marked assistance in grappling with the problem of soil erosion, the only sound and permanent cure for the trouble will be found in scientifically planned agricultural practices. Any sincere attempt at remedial measures must result in attention being given to the following points:—

(1) Reduction of the stocking of the property to a sound level.

(2) Subdivision of the holding and a sound system of pasture management, including rotational grazing, renovation and manuring.

(3) Rotational cropping.

(4) A cropping programme which permits of continuous supply of soiling crops, which will relieve pastures, and permit of minimum drain on fodder reserves,

(5) An adequate supply of conserved fodder which will obviate damage to pastures and covering.

(6) The introduction of the practice of green manuring which can do much to repair

the wastage of organic matter.

The general lay out of the property should come under review. Slopes too steep for satisfactory cultivation should be transferred to pasture; narrow lanes should be superseded by wide lanes which would minimise loss of soil from cow tracks; and cultivation should be across the slopes, where possible, in place of up and down.

#### Preventive Measures on the South Coast.

J. W. BOYLE, Agricultural Instructor.

SOIL erosion has already caused considerable damage on the South Coast and is liable to become a serious problem unless steps are taken immediately to combat it. Some still maintain that no erosion of soil has occurred in this district, but the increasing appearance each year of stones and gravel in paddocks is sufficient evidence that the surface soil is being gradually depleted by water erosion. common sight of better crops appearing at the bottom of a slope than at the top, is often due to the surface soil of the hill being carried down to increase the fertility at the bottom.

Because of the increase in pasture improvement, and the fact that coastal dairymen are realising that fodder conservation is now necessary, many acres of country are being ploughed for the purpose of laying down pastures and growing such crops as oats, millet, sorghum and maize for hay and silage on the hilly undulating coun-try of the South Coast No flats are available on hundreds of farms. Hills have been, and will continue to be used for cropping purposes, and steps should therefore be taken to minimise the run off of water, following heavy rain, which carries with it the best of the soil, and in time must cause serious gullying.

In spite of the warning given years ago for

farmers to cultivate and sow across the slope, some still cultivate with the fall when it can easily be avoided. Working across the slope or with the contour entails shorter turning, but if more attention was to be paid to the dangers of crosion and less to the extra time the job is going to take, some of the erosion dangers would be lessened.

A farmer in the Candelo district who practises contour farming, has a spirit level fitted into his tractor; this is by no means perfect, but helps considerably in reducing erosion when cropping takes place on his hills.

#### The Dangers of Overcropping.

Overcropping on our coastal farms must be guarded against if soil erosion is to be kept in Continuous cropping of the same paddock or paddocks to grow fodder crops or sufficient material to fill the silo, is one of the major

causes of erosion. Continuous cropping lowers the fertility of the ground, and the danger lies in the fact that ground of low fertility washes more readily.

To guard against overcropping a system of pasture improvement is necessary, rotating crops with pastures, and wherever possible no more than two crops should be taken from a particular paddock before laying down to pasture. By this means a good sward can be obtained and erosion dangers minimised, and cropping after pasture will result in better crops. If a paddock is cropped for too long it will be found difficult to get a good pasture cover back on to the ground until the fertility has been lifted; growth is slow and germination often bad, leaving uncovered ground which is subject to erosion. The rotation of crops with pastures may appear difficult in some cases, but with more subdivision and planning the system will become easier after a few years.

#### Overstocking Causes Damage to Pastures.

The drought experienced during 1940 indicated that overstocking on the South Coast is present on almost every farm and at times is liable to be the cause of serious erosion. normal years, the slow growth of pastures during June, July and August, and the numbers of stock carried result in the paddocks being eaten bare in many cases, and often so hare that they erode when heavy rain falls. Overstocking will be diffi-cult to control on the South Coast. The spring and summer growth is so vigorous in a normal year that heavy carrying is necessary to compete with it and to lessen the dangers of bush fires. Overgrazing in the winter or in a drought period appears to be the main danger, and this can be overcome to a large extent by subdivision of properties and by adopting a system of rotational grazing. By these means grazing of paddocks can be controlled and a better cover of grass maintained on them. In subdividing a property care should be taken to subdivide as far as possible with the contour, so that when the time comes to plough or crop the paddock, it will not be found too difficult to do so, with or as near as possible to the contour.

#### Contour Drains.

In addition to giving greater attention to cropping, stocking and contour cultivation, the use of contour drains should be considered by many farmers on the South Coast They have proved efficient in the Bega district. It is considered better to construct drains with a fall of 12 inches in 100 feet instead of 18 inches, as previously, and to put the drains closer together. Another method which can be recommended is, where possible, to start the contour furrows in the centre of a paddock and run the drains both ways.

thus splitting up the flow of water.

The use of fallow is to be recommended, but this is dangerous on sloping ground on the coast if precautions are not taken to guard against The ground should be left in a rough erosion. state until four to six weeks before it is intended to sow. The working of the ground into a firm reasonably fine seed bed then makes the construction of contour drains necessary. It is not

(Continued on page 20.)

#### Varieties of Oats and Barley.

#### Recommendations for 1942 Sowing.

ONE of the essentials to success in the growing of the winter cereals, eats and barley, is to sow varieties suited to the climatic and soil conditions.

The following are the recommendations of the Department of Agriculture for the 1942 sowing season for different districts and purposes:-

#### OATS.

#### North Coast.

For early green fodder—Sunrise, Buddah. For grazing-Fulghum, Algerian.

#### South Coast.

For early green fodder—Belar, Sunrise, Mulga, Buddah.

For grazing-Algerian, Fulghum.

For late green fodder—Algerian.

#### Northern Tableland.

For grain, hay, or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing)— Lampton.

For grazing only (autumn sowing)— Fulghum.

For grain or hay (spring sowing)—White Tartarian, Lampton.

#### Central Tableland.

For grain, hay or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing)— Lampton.

For grazing only (autumn sowing)--Fulghum.

For grain or hay (spring sowing)—White Tartarian, Lampton.

#### Southern Tableland.

For grain, hay or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing)— Lampton.

For grazing only (autumn sowing)-Fulghum.

For grain or hay in coldest parts (spring sowing)-White Tartarian, Lampton.

#### North-western Slopes and Upper Hunter.

For grain, hay or silage-Algerian, Belar, Burke, Mulga, Buddah.

For grazing— Algerian, Burke, Fulghum.

#### Central-western Slopes.

For grain, hav or silage-Algerian, Belar,

For grain, hay or silage in drier parts—

For grazing—Algerian, Burke, Fulghum.

#### South-western Slopes and Eastern Riverina.

For grain, hay or silage-Algerian, Belar, Burke.

For grazing- Algerian, Burke, Fulghum.

#### Western Plains and Western Riverina.

For grain, hay or silage-Belar, Burke, Gidgee, Mulga.

For grazing—Burke, Fulghum.

#### Murrumbidgee Irrigation Area.

For grain, hay or silage--Algerian, Belar, Burke.

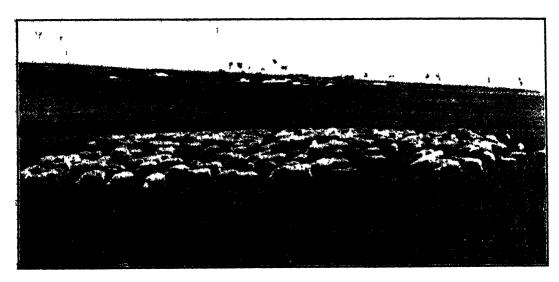
For grazing-Algerian, Burke, Fulghum.

#### BARLEY.

#### Recommended Varieties.

The varieties of barley recommended by the Department are: -

> Malting or two-row type-Pryor. Feed or six-row type-Trabut (for green fodder or grain).



#### Oats for Sheep on Wheat Farms.

#### Excellent for Grazing and Fodder Reserves.

C J. KING, BA, BV Sc, DP.A.

IT is generally admitted that more mixed farming within the wheat belt is one of our most pressing needs. In practice this means such change over in the management of the farm that in place of one primary source of revenue there will be two or more; oats and lucerne must be substituted for at least part of the wheat crop, and more sheep must be raised.

For sheep, feed is the first consideration—not feed in super-abundance at one season of the year, but feed all the year round. To supply this requires the abandonment of reliance on stubble, fallow grazing and natural pastures alone for sheep, and instead the cultivation of fodder crops, and the practice of fodder conservation.

Of all the crops which can be grown on the wheat farm as a source of grazing and reserves of fodder there is surely none quite as satisfactory as oats. There is certainly none which can be so variously and profit-With the varieties now ably utilised available, oats provide green grazing from early autumn to spring. Five to six weeks after planting there is rich succulent green feed. True, the feed is not quite perfectmortality will occasionally occur through the development of hypocalcaemia, or "oat tetany," but the occurrence is not common. Also, the lush feed alone may predispose the lambs to pulpy kidney (entero-toxaemia).

unless some harder feed, as natural pasture, hay or chaff is available. Thus grazing of oats is best combined with natural feed, hay or chaff, the combination giving a better balance. As with all other rich pastures, however, the best plan is to fence off into suitably sized paddocks, feeding off small area by small area, and resting the paddocks until recovery and regrowth have occurred. Controlled in this way, the stand of oats improves with stocking in the young stage, and up to five to ten sheep to the acre can be carried for short intervals over many months.

#### Green Crops Essential for Fat Lambs.

Ewes can be lambed on oats, and the lambs will fatten quickly. As the topping off stage occurs, the self-feeder can be brought into play, and the lambs will suffer no setback. Lambing can be arranged to time with the greatest flush of green feed. There is no reason why fat lambs cannot be produced on mixed farms if oats are

grown, but every reason why the proposition will be a failure if a green crop is not available. Perhaps the primest fat lambs may not be possible, but at least good sheep can be grown on the mixed farm, and profitably reared through the medium of oats and the self-feeder.

These grazing oats are not always suitable for hav or grain, but the growing of suitable varieties separately for these purposes presents no great difficulty. It is impossible to conserve too much of them —the hay in stacks or baled, the grain in cheaply constructed iron silos, silage in pits. All will keep for a long time. If prices are attractive, part may be sold, but at least a considerable portion should be kept for feeding back in the summer, and in and out of season as the need arises. If only a small flock is raised, the position is easy, but if there is a considerable one and returns are looked for, this hand feeding is inevitable. The more sheep that can be carried the greater the returns.

#### Hand Feeding Not Just a Drought Measure.

The idea of hand feeding is all too often associated in the minds of stock owners with drought. Self-feeding of chaff and grain is looked at askance, with justification perhaps in the western areas where crops are difficult to grow, but certainly not in the rest of the State. The aim of the mixed farmer in the wheat belt will not be to produce hay, grain and silage for sale to not-so-safe areas in time of drought. His object must rather be to feed all or most of the feed grown in a normal year back to his sheep, to be sold in the form of sheep, any residue being stored for the next year. Income will come from the sheep and wheat, and only to a lesser extent from other sources. If the sheep returns are to be worth while and compensate for the loss of part of the wheat cheque, and if the property is to pay, sheep numbers must be maintained. It is the size of the flock carried over the whole year which matters, and has to be budgeted for.

There is only one solution—realisation that hand feeding of the sheep with the grain and hay produced must at some times of the year be carried out, not as an exceptional measure, but as a normal practice,

and this means adoption of the use of selffeeders to reduce labour costs, and their installation in all paddocks, so arranging them that to fill them is an easy matter. This does not imply that at certain times sheep are subsisting entirely upon chaff, though there is nothing revolutionary in this, but rather that the supplement is always available in a time of natural feed shortage. The only way to estimate the costs is to balance outgoings (costs of planting and seed) as against returns (sheep and wool produced). The variable factor is the cost of handling the hay, the chaffing and the filling of the feeders, and this is where experience and practice will count. The chaff and grain will suffice to feed the stock.

#### Need for Diversification Still Not Sufficiently Recognised.

None of the foregoing is new—the wisdom of more extensive sheep raising has often been emphasised. In any of the wheat growing districts in the winter can be seen flocks of ewes on green oats, contentedly grazing. On every property can be seen the oaten stack, for the horses have to be fed. On many properties can be seen the self-feeder. All will agree that 200 sheep pay better than 100. But the properties where the land is devoted exclusively to wheat, to fallow, and to grass, and where the sheep are regarded as little better than necessary evils to keep the grass down and to eat out the stubble are still all too numerous. All is well when wheat prices are high, but dangerously unstable when prices return little more than costs. It is then that new methods have to be sought. One method is to grow oats, as much oats as possible, increase the number of sheep, graze off the oats in the winter, self-feed in and out of season with chaff and grain, and to grow lucerne for summer grazing to "anchor" the land to make use of the summer rains otherwise lost.

There is no stock market so stable as sheep, no commodity as readily marketed as wool, but neither the one nor the other can be profitably produced unless intensive methods can bring from the land all the feed it will produce. Feed sheep well and they pay.

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Mr J. H. Smith, of Tooraweenah, writes:

I marked a mob of Lambs and also dressed some Rams about a fortnight ago I inspected them to-day and, to my surprise I didn't find a single one struck with flies, although they have been bad PEGASOL is certainly good

Mr. H. E. Rixon, Culgoora

I want to say a word in praise of PEGASOL. Since using it, as a dressing at lamb-marking, I have not had one struck with the I ly

Mr. W. D. Heffernan, Junee:

When mustering a line of Wethers, I found most of them badly blown. I just poured some PEGASOL solution on the worst of them and rubbed it in with a stick. The next day I went over the ones treated in this way and found them free of maggots and nicely dried up. So I ordered another tin of PEGASOL at once and have since used it with the same good results. It is certainly the best dressing I have used.

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### Wimmera Rye Grass And Subterranean Clover.

### An Economical Pasture for Irrigation.

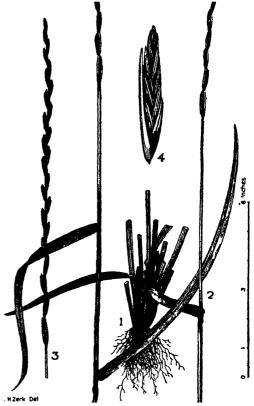
W. M. Curteis, B.Sc.Agr., Agricultural Instructor.

WITH the shortage of labour and the rationing of superphosphate, all settlers on the irrigation areas and those irrigating large areas from pumping plants should seriously consider the advantages of Wimmera rye grass and subterranean clover for providing autumn, winter, and spring feed.

This pasture and lucerne give a supply of feed all the year around. It should be the aim of every settler to have a proportion of his area sown with lucerne to provide hay and summer feed, and most of the rest of his irrigable holding should be sown with pasture for autumn, winter and spring grazing. Wimmera rye and subterranean clover is a useful pasture for this purpose. On new irrigation land it is always advisable to sow summer fodder crops, such as Japanese millet and Sudan grass, and also oats for winter grazing, but these crops should be considered only as preliminary crops for lucerne and pastures and not permanent features of the rotation. They are uneconomical as regards water and labour requirements compared with permanent crops. Of course, in a dry summer Japanese millet or Sudan grass can always be sown for quick grazing and reserve fodder.

#### Saves Water and Fertiliser.

A Wimmera rye grass and subterranean clover pasture usually needs only three 4-inch waterings, whereas lucerne and a permanent pasture mixture of perennial rye, cocksfoot, *Phalaris* and white clover requires up to eight 4-inch waterings. This is a considerable saving in water and labour costs. The other saving is in superphosphate, for a good Wimmera rye-subterranean clover pasture can be maintained on an annual top-dressing of as low as I cwt. superphosphate each autumn. No other winter pasture would give as good results on such a small amount of fertiliser. Naturally, better results would be obtained by



Wimmers Rye Grass.

increasing the amount of superphosphate, but during the war it may be difficult to obtain large quantities of this fertiliser.

It has often been stated by inexperienced persons that the grading and lay-out of the irrigation block need not be carefully done for the sowing of Wimmera rye and subterranean clover. This is a fallacy, for the more careful the grading and the more accurate the lay-out the quicker will the water get over the paddock, thus saving not only water but time. If continued waterlogging occurs salt trouble may develop and there is an increase in weeds which thrive in swampy situations.

No bays should be longer than 10 chains, and, on sandy soils, they should be only 5 to 7 chains in length. Although check banks can be spaced a chain apart it is found that better water control is obtained by having

the check banks every half chain, especially on land with a good side fall. As with all irrigation, clean and well constructed channels and ditches are essential, and proper facilities must be made for drainage.

#### Sow in March.

Almost any irrigable land is suitable for this pasture mixture. A thorough preparation of the soil is as necessary for pastures as for lucerne in order to form a firm, fine, seed bed. March is the best month for sowing, as the plants make good growth before the cold winter months and are able to compete with weeds. Moreover, water can be applied before the end of the irrigation watering season. Best results are obtained by germination being brought about by rainfall, but if rain has not fallen by the end of the watering season this pasture can be effectively germinated by light irrigation.

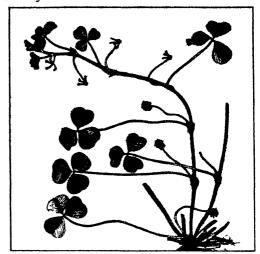
Good results are obtained with 3 to 4 lb. subterranean clover seed and the same amount of Wimmera rye per acre. The Wimmera rye seed costs approximately 6d. a pound, and subterranean clover seed can be purchased for up to 1s. 6d. a pound. When ordering subterranean clover Mount Barker strain should be specified, for this mid-season strain has given the best results under irrigation. The seed should be mixed with 1 cwt. superphosphate and sown with the drill or combine.

#### Sow Across Check Banks.

As with lucerne the seed should be covered lightly and sown over the check banks. Sowing on the check banks lessens the chance of weed growth and consolidates the banks. With good grading there is no need for higher check banks than 6 inches when settled and 9 inches when constructed, and no difficulty should be experienced in sowing over them.

The practice of sowing a cover crop of oats with this pasture mixture is not a good one, for all attention should be devoted to the establishment of the pasture and not to the oat crop. If more winter grazing is wanted during the first year it is better to increase the quantity of subterranean clover seed rather than include oats in the mixture.

A light grazing can be given eight to ten weeks after sowing, and the grazings continued until about the end of October. For the first year it is advisable to prevent sheep grazing too closely, for the seed runners of the subterranean clover may be destroyed.



Subterranean Clover.

#### Allow to Seed Each Year.

It must be remembered that both Wimmera rye grass and subterranean clover are annual plants, and therefore care has to be taken to ensure that the plants seed each year. Seeding takes place in November, and the pasture dies off until it develops the following autumn. The subterranean clover seeds are borne in clusters along the runners. Some of these clusters turn down as soon as the seed is formed and bury the seed pods in the soil.

A watering should be applied at the beginning of March in order to commence germination and promote early growth. Under normal rainfall conditions only one other watering is necessary in the autumn and one other early in the spring.

As many as ten sheep to the acre can be carried on this pasture during the growing period. Generally some excess feed accumulates during the latter part of the growing season and this, if plentiful, will carry up to two sheep per acre during the summer months. For the best carrying capacity heavy top-dressing with superphosphate is necessary and rotational grazing should be practised.

With proper management this pasture will last for many years, and the subterranean clover combined with the superphosphate will have an excellent effect in raising the fertility of the poorer classes of soil

#### FIELD BINDWEED OR WILD MORNING GLORY.

#### A MENACE TO IRRIGATED AREAS.

A. PEARSON, H D.A., Weeds Officer.

BINDWEED (Convolvulus arvensis) has spread widely over the Murrumbidgee Irrigation Areas during the past three or four years, and while the individual infestations are not generally extensive, there is no doubt that the weed is a distinct menace to the horticultural and viticultural portions of the irrigation areas. It also occurs as light infestations throughout the wheat districts, where it can be effectively controlled by planting the area to competing pastures or lucerne.

Bindweed is a particularly difficult plant to kill All landholders can, however, prevent the further spread of the pest, although complete eradication of large areas may not be possible for a lengthy period.

The plant is a perennial of twining habit, with a very deep root system. The leaves are alternate and heart-shaped, but tend to become arrowshaped on the upper part of the vine. The flowers are white, or sometimes pink, and about 1 inch in diameter.

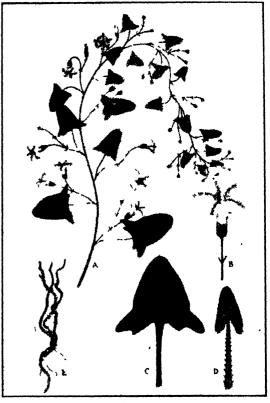
Bindweed produces large numbers of brownishblack seeds, each about one-third the size of a wheat grain, roughened on the surface and generally flat on one side Root fragments will grow under favourable soil conditions and can start new infestations if moved with nursery stock.

The Department of Agriculture is at present experimenting on a number of irrigation farms with the aim of evolving practical positive methods of control for large outbreaks. Landholders should bear in mind that the first line of attack with this weed is to prevent seeding, either by grazing or mechanical means.

#### Single Plants and Small Patches.

Effective control has been obtained by the use of sodium chlorate applied in solution at ¼ lb. per square yard. This chemical is, however, now unprocurable, and further supplies cannot be expected to be available for the duration of the war.

Where single plants and small patches are not in close proximity to trees or vines, the weed can be killed by applying ordinary coarse salt. It is necessary to apply salt at the rate of Ib. per square foot or approximately 10 tons per acre. Such an application will give complete soil sterilisation, so that it can be readily understood that the scope of such treatment is strictly limited. When applying salt it is advisable to make the application during the growing period of the bindweed, with the salt in the dry form and to work it lightly into the soil.



Field Bindweed.

4 - Portion of stem with leaves B - Solitary flower.

C.-A leaf. D.-Solitary stamen. E - Root system.

It has been positively shown on one farm at the Griffith end of the irrigation area that small patches of bindweed can be completely eradicated by constant hoeing. In the case in question the bindweed was cut out with a hoe every time it had a few days' growth above ground, the treatment extending over about eighteen months before complete destruction resulted.

#### Large Areas and Heavy Infestations.

The weed is one that is spread by normal cultivation methods, but it will not withstand flooding, so that where rice can be grown, effective means of control are readily available

It is not thought at present that bindweed can be killed out by plant competition, but at least it can be effectively controlled and further spread prevented by the competition afforded by good pastures or lucerne.

In tree plantings, where the infestation is heavy, it is suggested that the areas should be sown to either lucerne or pastures with a legume base. Systematic mowing will be necessary to prevent seeding of the bindweed, but such cover cropping will not deleteriously affect the returns

from the trees. In isolated instances orchardists may be able to graze the areas judiciously, and such treatment would benefit the land besides

further retarding the bindweed.

While small pieces of bindweed roots will grow and start new infestations if carried from place to place by farm machinery, several growers have kept the weed in check by constant careful cultivation. It appears that constant cultivation at the correct stage of growth will eventually kill bindweed completely, but definite results have not been obtained in New South Wales. The Department is at present carrying out field tests with this method.

#### American Experience.

The Kansas State Board of Agriculture, in "Summary of Bindweed Situation" published in June, 1940, gave particulars of methods employed in eradication work. It is stated that bindweed may take up to two years to kill by cultivation, and that—

"Generally the first year the bindweed should be cultivated once each two weeks, providing the cultivation work is 3 to 5 inches deep. After the bindweed is allowed to grow eight days above ground, it has the ability to feed the root system; since cultivation is a method of starving the root system, the above ground growth should never be allowed to reach that stage. A system of cultivating each two weeks is considered hest for the first year. As the bindweed becomes weaker, and starts to grow slower, cultivation may be delayed in order to allow the bindweed to grow for one full week after it emerges through the ground.

"For this work duckfoot implements that are kept sharp and have an overlap of 3 inches are used. When working on these lines only fifteen cultivations were required to eradicate bindweed."

#### Report Outbreak and Seek Assistance.

On the Murrumbidgee Irrigation Area two committees have been formed to advise on the control of bindweed. These committees comprise representatives of the respective shires, the Water Conservation and Irrigation Commission, the Rural Bank and the Department of Agriculture.

Suspicious plants or outbreaks should be reported, and if advice is needed, application should be made to the local shire or to officers of the

Department of Agriculture.

#### Be Economical in the Use of Vegetable Seed.

(Continued from page 2.)

growers to use all available seed to the best advantage and strongly advises against wasting it. This advice especially applies to seed of root crops, particularly to carrots, of which there is a shortage of seed in this country at present, and the prospects of obtaining seed in the near future are not bright.

It is a common practice amongst growers when sowing carrots and even other vegetable crops, in order to obtain a satisfactory stand, to sow the seed at an abnormally heavy rate. Under existing conditions this practice is definitely inadvisable and must

be discouraged, as it is wasteful.

By adopting sound cultural methods, much better use could be made of the available carrot seed and the necessity for heavy seedings thus avoided. In the first place, the land should be thoroughly prepared and in a fine moist condition at sowing time. The seed should not be sown too deeply, otherwise germination may be affected, half an inch being the recognised depth under most conditions. Carrots cannot compete with weeds, particularly in the heavy stages of growth, and it is therefore important that weeds be kept under control.

The most difficult carrot crop to grow is the one sown during the hot summer months, mainly because of the difficulty of obtaining a satisfactory stand due to the fact that the high temperatures burn off the plants. Unless growers are able to establish the crop without making heavy and frequent seedings, sowing at this time is not recommended in times of seed shortage. Growers with irrigation facilities and those situated in coastal districts having a reliable summer rainfall are best able to establish the crop in the summer months.

A common cause of faulty germination is the sowing of seed in direct contact with fertilisers. As with other vegetable crops, it is advisable to incorporate thoroughly the fertiliser with the soil before the seed is sown.

Finally, growers are advised not to sow excessively large areas at the one time, but to confine their attention to an area which can be efficiently handled with the labour available. It must be remembered that carrots require a good deal of attention whilst growing and when being marketed.

The question of raising seed locally should not be overlooked by growers who specialise in carrot production, and it is recommended that, where practical, attention be given to this aspect. Full information on the subject is available from the Department of Agriculture, Box 36A G.P.O., Sydney.



### Why it pays to feed "Meggitt's" to Ewes on Poor or Dry Feed

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(1) EASIER LAMBING

### (2) MORE MILK FOR LAMBS

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Resce.

Poor dry feed does not supply the nutrients required by ewes immediately before, and after family supply the nutrients lambing, because it is deficient in protein. Moreover, its fibroit is deficient in protein appears, which are responsible for digestive is that in protein (it deaths, as it is not restain 6% of Linseed Gil, conditioning effect. Its content of Vegetable and the action of the oil seat value in assisting moisture in the sheep's digestive tract, and in the respect has the same action as the continuity of a large bulk of success the content of these reasons that Meggitt's above that the sheep's digestive tract, and in it is for these reasons that Meggitt's is the content of a large bulk of success the content of these reasons that Meggitt's is the the most effective and economical supplement or sheep on dry feed.

### (3) REDUCED MORTALITY

### (4) Healthier, Better Grown Stock

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FOODS ACT to be the same as
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### STALLIONS REGISTERED.

#### Under the Horse Breeding Act, 1940.

HEREUNDER is the list of stallions registered under the Horse Breeding Act, 1940, until 31st August, 1942, and these are the only stallions which may be used for breeding purposes, with the exception of any thoroughbred horse entered in the Australian Stud Book and any stallion for which a permit has been issued, provided that it is used with its owners' mares only.

Every owner of a stallion must, not later than 1st March next, forward to the Chief Veterinary Surgeon, Department of Agriculture, a notice giving particulars of his stallion, and if the stallion is to be used with marcs not his own apply for registration on forms obtainable from the Department.

The abbreviations used in the following list are:-

Cl—Clydesdale; Tr—Trotter; Pe—Percheron; Py—Pony or Welsh Pony; Ab—Arab; Th—Thoroughbred or Blood; Dr—All unclassified draught stallions; Ga—Galloway; Lh—Light; Abx—Arab-Cross; Sr—Shire; Sp—Suffolk Punch; Cb—Cob; Pa—Pacer.

### Registered Stallions in the Area Controlled by the District Veterinary Officer, Armidale.

#### Armidale Pastures Protection District.

On ner.	Address.	Name and Breed of Stallson.	Owner.	Address.	Name and Breed of Stallson.		
Bell, D. J  Box Hills Pastoral Co. Brazier, C.R	Kentucky	Omaru Lad (Cl). Amazing Don (Tr). Noble Grand (Cl).  Glen Bower Footstep (Cl).	Smith, M	Walcha Armdale Upper Bowman Armidale Armidale Bendemeer	Novelty (Py). Wynot (Pv) Barney Second (Ga). Dandy Dick (Cl). Blythsome (Cl). Shamrock (Py).		
Dangar, C. C. (Est.) Dutton, L. P. Fittler, A. J. Forster and Sons Forster and Sons Frizell, G. Heagney, W. J. Mackay, J. D. March, N. L.	Uralla Guyra Armidale Armidale Armidale Wollomombi Armidale Armidale Armidale Armidale Armidale Yarrowitch	Gostwyck Prince (Sp). Lockside Chief (Cl). Dandy (Cl). Marktwain (Cl). Dandy (Py). Coo-ee (Py). Hugo (Cl). Blue Bay (Th.) Birchgrove Welsh Dragon (Cb).	Starr, H.  Symington, A. M Symington, A. M. Vickery, J. F. and S. Williams, C. J.  Williams, R. D Wood, J. S	Armidale	Beneficial Draught (Cl), Bonnie Glim (Py), Fulhampton (Pa), Fezei (Ab), Lyndhurst Chiefton (Cl), Shaherar (Ab), Royal Arthur (Cl).		
Glen Innes Pastures Protection District.							
Cousins, E. M Currie, R. H Department of Agri- culture.	Glencoe Furracabad Glen Innes	Mighty Willie (Cl). Royal Prince (Th). State Drummer (Cl).	Ebsworth, J. T Egan, P Hogbin, J. G. A Kempton, G. M	Glen Innes Ben Lomond Glen Innes Red Range	Robin Adair (Py). Erin's Hope (Th). Little Gem (Py). Merrymaker (Cl).		
Department of Agri- culture.	Glen Innes	Diplomat (Imp.) (Cl).	McLeud, M. G. Wilson, W. H.	Ben Lomond . Furracabad	Lord Hosier (Th). Parliwidgee Freestep		
Duncan, W	Glen Innes	Blairmount Gladiator (Cl).	Wright, C. M	Armidale	(Cl). Radon (Ga).		
Inverell Pastures Protection District.							
Anderson, A Kennedy, W Moran, W. J. M Pearse, W. L	Inversil Nullamanna Cherry Tree Hill Inversil	Lord Manton (Th). Clover (Cl). Young Shahzada (Ab). Tweedsyde Hero (Cl).	Spray, W. C Strahley, C. J Vivers, A. and G. A. Wallis, A. O	Inverell Inverell Glen Innes Rocky Glen	Fyvie Ideal (Cl). Robin Hood (Abx). Pme Vale Squire (Cl). Fly Wedge (Th).		
Moree Pastures Protection District.							
Bell, M Daley, R. H Hays, N Kirkby, (Mrs.) V. E. Morrison, R. L	Gravesend Gravesend Narrabri Bellata Garah	War Dale (Cl). Mr. Bruce (Th). Marvel (Lh). Bongoola (Th). Bruce Junior (Lh).		Moree Narrabri Moree Garah	Black Borneo (Lh).  Double Forty (Ab). Captain Bruce (Py). Legal Chatter (Th).		

	N	arrahri Pastures Pro	tection District.		
Owner.	Address.	Name and Breed o Stallion.	Owner.	1 ddress.	Name and Breed of Stallion.
Brennan, M Dewson, W. B	Wee Waa	Pacoota (Th).	O'Rourke, J. A	Wee Waa	Lord Thespian (Th).
Dewson, W. B	Wee Waa	Duty Stamp (CI).	Pawley, A. E	Narrabri	Pompous Lad (Py).
Killarney Station	Narrabri Bellata	Major (Cl). Lancrodion (Th).	Pawley, A. E Wallah Pastoral Co.	Narrabri Narrabri	Bay Baron (Cl). The Waif (Abx).
Lillyman, E. H Lynch, M. M	Bellata Wee Waa	I atleton Refiner (CI).	Pty. Ltd.	Managar	The Wat (Aba).
Melbourne, C. H		Hillfield Baron (Cl).	2 031 22000		
·		Pilliga Pastures I	Protection District.		
Gordon Bros	Windella	Stratheona (Ab).	Watson, W. G	Bellata	Gallitor (Th).
Hatton, O. M.	Wee Waa .	Jalengla Lucky Jim	Worrell, F. E	Isrienbri	Golden Spear (Th).
Mullane, W. O	Barren Junction	(Py) Calltrue (1h).	Wright, A. J Wright, A. J	Burren Junction Burren Junction	Gharkiu (Th). Diamond Prince (Cl).
Slack Smith, J	Bu ten Junction	Spats (Th).	<b>.</b>	<b>3</b>	, , , , , , , , , , , , , , , , , , ,
		Tamworth Pastures			
Brady, J Bridge, B Brodbeck, C. H	Gunnedah	Barranilla (Th).	Johnston, W. J	Nenungha	Kootingal Wood (Fr).
Bridge, B	lamworth	Charldos (fh). Victory (Pv).	Keys, W Maher, R	Manılla	Coo-ee (Py). Bombmaker (Th).
Brotheck, C. H Buckley, F. P	Barraba Gunnedah	Merry Mead (Pv).	Maher, R	Attunga	Air Raid (Th).
Carter, H. C	Quirindi	Baroona Bradman	Mason, H. S	Manilla	Saladin (Aba).
		(Sp).	Moorehead, II	Manılla	Chicago Lad (Tr).
Clift, A. B	Breeza	Valleau (Th).	O'Neil, H. F	Werris Creek	Radium (Th).
Connelly, J. T.	Moor Creek	King Eagle (Th), Beaconsheld Dup-	Poetscha, A	Dungowan	Young Baron Bel- mont (Cl).
Corderoy, L. F	Quipolly	heate (Cl).	Porter, H. C	Tamworth	Black Land (Th).
Crossing, H I. M.	Spring Ridge	Brown Colley (Cl),	Porter, J.C	Quiradi	Prince Zada (Ab).
Douglas, E. G	Gunnedah	Royals Last (Pa).	Robson, T	Čiows Nest .	Prince Zada (Ab). Wolsingham Sir Bril-
Elsley, B. O	Spring Ridge	Thurlo Prince (Cl).			hant (Cl).
Elsley, B. O	Spring Ridge	Thurlo Dandy (Cl). Werndow Enter-	Robson, T	Crows Nest	Wolsingham Brilliant
Elsley, B. O	Spring Ridge		Robson, T	Crows Nest	Boy (Cl). Superb (Cl).
Fleming, T. I., and	Willow Tree	prise, (Cl). Jalengla Noble Jim	Robson, T	Crows Nest .	Wolsingham Bold
J. J. L.		(Pv).			Wolsingham Bold Boy (Cl), Vue Bonnie Banker
Forge Bros	Tamworth	Gilbrae Chancellor (Cl).	Roser, T. C	Quirindi	(Cl).
Gennar, W	Barraba	Prince Charley (Dr).	Swam, W. G.	Kootingal	I ord Monarch (Dr).
Hamilton, F. W.	Boggabri	Dulcedo (Th). The Barnacle (Tr.)	Taiping Investments (Australia) Ltd.	Willow Tree	Abdul (Abx).
Hall, C. F Hayne, N. P	Manilla	Mittens (L.h).	Vickery, E. K	Boggabri	Prince Ornick (Cl).
Heyman, C. M.	Nundle	Happy Jack (Lh).	Worboys, M. G	Gunnedah	Kırndeen Peter (Cl).
Holcombe, E. J	Famworth	Happy Jack (Lh). Belmore Don (Cl).	Wright, J. P. and	Dungowan	Melrose (Py)
Harland, C	Gunnedah	Wilbur Glen (Tr).	1 P.		
Horneman, N. D. S.	Somerton	Hawk, (Cl).			
		Tenterfield Pastures	Protection District	<i>t</i> .	
Baker, A. E	Ashford	Royal Radium (Ga).	Dowe, H. S	Tenterfield	Bonnie (C1).
Bruxner, M. F	Tenterfield	Transport Ben Wil-	Dowe, H. S	Ienterfield	Prince Kerrston (Cl).
Denumer M. F.	Tantombald	low (Cl).	Finn, C	Tenterfield .	Mount Gap (Th).
Bruxner, M. F Campbell, R. J. and	Tenterfield Bonshaw	Sunny Jim (Py). Royal Boy (Th).	Ford, S. D.	Drake	Young Archie (Ih).
D. A.	D01131144	Royal Doy (111).	Jeffrey, G K	Tenterfield	Craigie Boy (Cl).
Connolly, J. S	Tenterfield	Grev Boy, (Ab). Emerald Jim (Py).	Jeffrey, G. K	Tenterfield	Kiallan Flash Lad
Deepwater Estate	Despwater	Emerald Jim (Py).	Jeniev, d. K	icitti urai .	(CI).
Ltd. Deepwater Estate	Deepwater	Hamac II (Pe).	Muigoola Pastoral	Tenterfield	Mount York Baron (Cl).
*****		Malasti Dastinis 1			\ <del></del> /-
24 24'0	*** *	Walgett Pastures 1	From District.		
McMillan, R .	Walgett	Artist (Py).			
		Warialda Pastures	Protection District.	•	
Armstrong, G	Bingara	Winston Keynote	McMaster, J. C	Warialda	Dandy Jim (Py). Netherdale Crystal
Dantes A D	117a m 1.1	(C1).	Munro, H. R	Bingara	Netherdale Crystal
Boyton, A. B Butler, K. H. J	Warialda Bingara	Darinth (Ab). Sir Bruce (Pv).	Robinson, C. D	Gravesend	Prince (Cl). Rose Shahzada (Py).
Doolan, R	Bingara	Bay Epping (Py).	Sinclair, P. J	Moree	Gallopoli's Pride (Th).
Hartog, C. I	Bingara	Sugar King (Tr).	Waters, J. C.	Gravesend	King Hector (Py).
		•	-		

### Registered Stallions in the Area Controlled by the District Veterinary Officer, Grafton.

Casino Pastures Protection District.

Owner.	Address.	Name and Breed of Stallion.	Owner.	Address.	Name and Breed of Stallion.
Alexander, B. P Creighton, A. W Creighton, R Creighton, R Darragh, B. J Henderson and Car- dow Pty. Ltd Imeson, C. E Johnston, A. R. H.	Warning to	Young Lochiel (Cl.) Ben Shaza (Ab). Barcona Lingard (Sp)	Maher, A. F. Mukahy, J. D. Pratt, J. T. Riley, J. R. Rutledge, W. H. Smith, D. G. Trustum L. J. Wilson, J	. Urbenville Kyogle	Prince Nolan (Dr), Royal Star (Py), Donald McKenzie (Cl). Papua (Th), Argyle (Cl). Lockyer Premier (Cl): Lowan Prince Craig. No Gift (Th)

#### Grafton Pastures Protection District.

Owner.	Address.	Name and Breed of	Owner.	Address.	Name and Breed of			
(TWHEEL	144476 101	Stallion.	ouner.	**************************************	Stallton.			
Armstrong, A. H	Palmer's Island	Gulmardal Charffe (Cl).	Moloney, D. J Moran, T. J	Shark Creek Ulmarra	Highland Jim (Cl) Franc (Ga).			
Bailey, A. E Brown, C. M	South Grafton Seelands	Royal Shepherd (Cl), Midnight (Py).	Morton, A. J O'Meally, T	Corainba South Grafton	Glenrose Jackie (Cl). Wolsingham Progress			
Brown, G. R Cameron, W Clare, W. R Collett, G. C	Copmanhurst Dorrigo Woodford Leigh Ulmarra	Dandy Jim (Py). Dr. Jim (Py). Noble (Cl). Prince (Cl).	Pitkin, A. C Sabien, N. C. (Mrs.)	Kangaroo Creek Upper Copinan hurst	(CI). State Duke (Dr). Reilly (Cl).			
Cowling, A. W	Kangaroo Creek South Grafton	Mechanic (Th). Sir George (Py).	Small, A. P	Upper Orara	Yarraman Bradman (Sp).			
Darke, I. (Mrs.) Dougherty, M Grace, R. H Green, H. J	Brushgrove North Dorrigo Ulmarra	State Hugo (Cl). Luchy Jim (Cl). Standard Bearer (Cl).	Teale, H. G Thompson, J Tindal and Hughes	Dorrigo Cowper Copmanhurst	Major (Cl). Chief (Pv). Westphalia Laddie			
Hamilton, O. R Hickey, R. W	hwingar Brooklana	Red Shadow (Ab). Cherokee (Py).	P. A Wright and	Hernani Station	(Dr). Blue-Bashi (Py).			
Hunter Bros Jackson, H. W McPherson, D. H	Copmanhurst Brushgrove Maclean	Noral (Th). Arab Boy (Ab.) Alma's Boy (Tr).	Sons Pty. Ltd. P. A. Wright and Sons Pty. Ltd.	Hernani Station	Manning Nelson (Cl).			
		ort Macquaric Pastui						
Capararo, A. G Craig, A. M Croad, J. A. V	Gleniffer Bellingen Kempsey	Ned Kelly (Py). Blue Ray (Py). Gold Fligher (Γh).	Muscio, W Osborue, R	Boorganna Kempsey	Prince (Cl). Brittannia Chieftain (Cl).			
Daniel A Davis, J. A Griffin, T. G	Crossmaglen Sherwood Kempsey	Royal Beach (CI) Farmers Friend (CI). Chrysolas Lad (Lh).	O'Sullivan, T Partridge, A. E Robinson, J. L	Comboyne Macleay River Wauchope	Colindin (Th). Ravelrigg (Dr). Lord Splendour 4th			
Henderson, J. C. &	Raleigh Raleigh	Cool Rex (Ga). Farmer's Friend (Cl).	Secomb, O. O	Willawarrin	(Py). Bundara Dandy Lion			
L. E. McKay, D	Bowraville Toorooka	Major Dale (Cl). Bogan (Cl).	Simmons, R. M	Macksville	(Cl). Kelso Commander (Cl).			
Metcalfe, E. H Moran, A	Kempsey Missabotti Wauchope	Sovereign (Py). Keynote Everard (Cl). Star of Raby (Py).	Smyth, J. B Supple, A. C Teague, R. S	Kempsey Watchope Bonville	Tingaroo (Py). Palrav (Lh). Jerry (Lh).			
Muscio, C. A	Wauchope	George (C1).	reague, K. S	Bonville	Jerry (I.III).			
	T	weed-Lismore Pastur	es Protection Distr	ncl.				
Alexander, E. L Brown, A. J Childs, R. L Collins, F. G Cram, J. E Dennis, T Gallen, P Gallen, P Harris, S. R Jeffrey, K. G	Wyrallah Tyalgum Wyrallah Lismore Doon Doon Stokers Siding Mullumbimby Mullumbimby Lismore Nunbin	Royal McKenzie (Cl). Fabric's Gaicty (Cl). Fabric's Gaicty (Cl). Rex Wilks 2nd (Tr). Lord Minton (Tr). Lon (Cl). Yodelling Boy (Py). Nolan Again (Cl). Chryawav (Th). Wee Glove (Py). Little Hero (Py).	Kelly, R. L. McCollun, W. F McInnes, E. S. Rayward, H. F. Roche, F. D. Soorley, J 1 urner, T. A. Veivers, D. Wilhams, V. Worley, R. R.	Eungella Uki Tyagarah Mullumbumby Murwillumbah Tweed Heads Duranbah Mullumbumby Kynnumboon	Red Seal (Th). Abdul (Ab). Nugget (C'). Jummy Delevan (Tr). Silver Seal (Py). Chinchilla (Py). Brown Jewell (Sp). Meicer (Th). Grevlock (Pv) Royal Shepherd (Tr).			
<b>₽</b>				,				

#### Registered Stallions in the Area Controlled by the District Veterinary Officer, Newcastle.

#### Denman-Singleton Pastures Protection District.

Ou ner.	Address.	Name and Breed of Stallion.	Owner.	Address.	Name and Breed of Stallion.
Andrews, A Binute, R Binute, R Casey, P. V Chapman, R. C Cowley, F. E. and C. Cowley, F. E. and C.		Steve (Ab). Maeranie (Th). Brilliant Boy (Cl). Blairmount Triumph (Cl). Bright Bruce (Ga).	Dangar, R. R. Ellis, D. S. Langdon, J. E. Langsford, H. McDonald, W. F. Shearer, W. A. A. Thorley, P. J. Clayden, A. B.	Singleton Howes Valley Singleton Singleton Singleton Singleton Singleton Sandy Hollow Musweilbrook	King Madiera (Sp).
Allen, C. M. Bartlett, D. N. Brown, J. H. Buckman, J. W. Carter, V. Corbett, J. A. Dawson, A. S. Dodd, C. Forbes, I. G. Gallagher, J. L. Gallagher, J. L. Gill, E. J.	Cundletown Woondooma Wingham Coralville Shannon Vale Barrington Coralville Bundook Barrington Gloucester Krambach Mirtim	Bimbashi (Ab).	Protection District Lee, W. H. Lowrey, A. W. McDonald, L. McNeil, H. Moore, F. W. Murray, H. I. Nicholson, N. Paterson, G. E. Rudkin, R. Towers, E. L. Webster, R. A. Wisemantel, W. Young, H. A. E.	Oxley Island Stratford Oxley Island Kramhach Mt. George Wingham Cundletown Krambach Stratford Coolongalook Bundook Krambach Burnell Creek	

#### Maitland Pastures Protection District.

Owner.	A ddress.	Name and Breed of Stailson,	Owner.	A ddress.	Name and Breed of Stallion.		
Crawford, H. Edwards, G. W. and R. A. Farley, L. T.	East Maitland Dungog	Boree Prince II (CI), Black Prince (Py), Kaludah (Py).	Peck, A. S. M. Sweetman, H. J. Taylor, G. Taylor, W. J. Y. White, R. R. Wills, J.	Dungog	Messenger (Pe). The Sheik (Py). Top Mark (Py). Billy (Lh). Dinkum (Py). Mullamuddy Sir Lyle (Cl).		
Merriwa Pastures Protection District.							
Bowman, A. I Harcourt, B. G		Wolsingham Suprem- acy (Cl). Nedjsha (Ab).	Nevell Bros Thompson, J. K		Sebagh (Ab). Solitude (Th).		
The Upper Hunter Pastures Protection District.							
Cumming, A. W	Ardglen Scone	Slumber (Lh). Carkoola (Py). Red Radium (Lh).	The Vale Pastoral Co. Pty. Ltd.	Aberdeen	Jack (Py). Lode Star (Lh).		
Mitchell, A. R	Scone Murrui undi	Bugler (Th X). Yarravale (Lh). Bruco (Py).		Murrurundi Murrurundi	3 3 3 3 3 3 3 3 3 3		

### Registered Stallions in the Area Controlled by the Officer, Cumberland.

Owner.	1ddress. Name and Breed of Stallion.	Owner.	Address.	Name and Breed of Stallion,			
Back, W. G Bank		Navua Pty. Ltd	Grose Wold	Springwood Rufue			
Childs, A. J Liver	pool . Curry Duke Prince (Cl).	Navua Ptv. Ltd	Grose Wold .	(Py). Banjo (Py).			
Derrig, J. E Richi	nond Major Windermere	O'Brien, C. H	Windsor	. Bob Tingle (Pa).			
Dept. of Agriculture Richt	(Cl). nond . State Idea (Cl)	Payne, R Payten, H. J. and		Sam s Promise (Th). Whynot (Pv)			
Gosper, S. E Wind		P. E.	Campbentown .	Whynot (Pv)			
Gosper, S. E Wind	sor Robert Derby (Pa).			Wee Georgie (Py).			
Hall, G. W Penri Hamer, W. E Liver		Philipott, E. M Reid, W. M	Belmore Springwood	Prince Comedy (Py). Don Toni (Pa).			
Hirst, E Ingle	burn . Craven Master Sprite			Wolsingham Links			
Hirst, E Ingle	(Py).	Samman, 13 C	Cala	Maker (Cl).			
Hirst, E Ingle Holland, G Glent			***	Royal Nejd (Py). Bonny Boy (Cl).			
Jones, C Liver	pool Dashing Robert.	Stephenson, H. J	Mt. Druitt .	Nightshade (Tr).			
Navua Pty. Ltd Grose	Wold Rob Roy Kenna Cup (Py).	Sullivan, E. J Sullivan, E. J	Ebenezer	Golden Spark (SP). Mooki Thunderer(SP)			
(To be continued.)							

#### Erosion Control on Coastal Farms.

(Continued from page 9.)

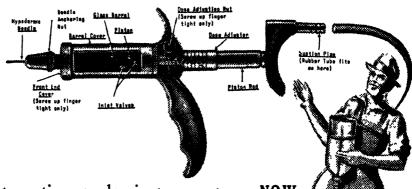
right to wait until the seed is sown to construct the drains, as it is some weeks before the grass is of sufficient growth to prevent erosion. If the banks are constructed prior to sowing, not much damage will be done to them when covering the seed and a good germination will be obtained along the drain. In construction of the drains, the furrow should be thrown down the hill; it will be found necessary in most cases to run the plough twice along the furrow to complete the drain. Once put in, these contour drains are as good as permanent, and only need touching up now and again to prevent the accumulation of rubbish, which may block the flow of water.

Gully erosion has not caused serious damage on the coast to date, but it can be seen on many properties, and once it is neglected it is very difficult to control. If attacked in the early stages it can often be overcome by ploughing to fill in the gully or lessen it, then sowing with grass. In severely eroded gullies there is no better grass than kikuyu. Anything to arrest the flow of water along the gully will help to prevent its further erosion; the use of banks made from stones, across the eroded gully at intervals according to the length of the gully, will arrest the flow of water and silting will gradually take place.

#### Pasture Care and Management.

The establishment and maintenance of a good cover of grass should be the first step taken to protect a property against serious erosion. The pasture should be established before the fertility of the ground is depleted to such an extent that it is difficult to get a good stand. When the pasture is established, its proper management, by subdivision of the paddocks to control grazing, regular topdressing and the provision of shallow contour drains to prevent the run off of water following heavy storms, is essential.

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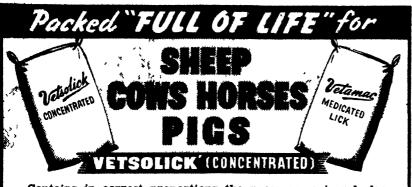
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## OIL MEALS.

# Not Sufficiently Appreciated as Stock Food.

#### Correct Method of Utilisation.

G. L. McCLYMONT, B.V.Sc., Veterinary Officer.

AS the result of the increasing growth and processing of oil seeds in Australia, larger quantities of such meals as linseed meal, copra meal (or coconut meal), peanut meal, cottonseed meal, and to a lesser extent, palm kernel meal, sunflower seed meal, and soybean meal are becoming available. These meals constitute a valuable source of stock food when properly used, but unfortunately many stockowners do not realise this fact, mainly because they do not appreciate the value of analyses as a guide to food values and they cannot apply correctly the knowledge gained from analyses.

Whether or not it is good practice to feed oil meals depends upon many factors, such as relative prices of the meals and other feeds, freight charges, other available protein-rich feeds, condition of the pastures, suitability of stock to be fed, methods of feeding adopted etc., but stockowners should give consideration to the merits of these meals to determine the possibility of their economic utilisation.

In the feeding of stock it is necessary first of all to understand the essential food requirements. These can be simply stated as: proteins, carbohydrates, fats, minerals, vitamins and water The ration must contain an adequate supply of these requirements, should be palatable and provide sufficient roughage or bulk.

Broadly, protein is concerned with the building up of protein-rich materials, e.g., meat, milk, eggs and wool; and carbohydrates and fats are necessary for the production of energy or fat. The greater the "production"—whether it be work, normal growth, fattening, pregnancy or production of wool, eggs, or milk—the greater the requirements of these nutrient materials, and, as the capacity of an animal is limited, the greater the necessity for them to be in a concentrated form.

Even when an animal is not being fed expressly for production, but merely for maintenance, as sheep and cattle under drought conditions, there is a necessity to supply additional protein to supplement the poor supply from scrub or dry grass.

These concentrated forms of foodstuffs are available in the form of grain, grain by-products, oil meals, and good pasture.

#### Definition of Terms.

It will be helpful if the stockowner understands the following terms used in connection with analysis of stock foods. The starch equivalent of a feed is the weight of starch which would be needed to replace 100 lb. of the feed in a ration, without altering the ability to fatten or produce energy.

The protein equivalent of a feed is the amount of nitrogenous material per 100 lb. of the feed that is available for the building up of proteins in the animal body. It cannot be used to maximum advantage unless there is sufficient starch equivalent in the ration to provide for energy.

In other words, the starch equivalent of a feed gives an indication of the value of the feed when all of it is used for fattening or energy producing purposes, and the protein equivalent gives an indication of the value of the nitrogenous portion of the feed for the production of protein of meat, eggs, milk, offspring and wool.

An ideal ration has the starch and protein equivalents balanced, i.e., there is a ratio between them that is suitable for a given purpose, this ranging from 1:5 or 6 (that is,  $\frac{P.E.}{S.E.} = \frac{1}{5}$ , or  $\frac{1}{6}$ ) for growing and "producing" stock, to 1:8 or 9 or 10 for stock merely being "maintained."

# Meals Compared with Each Other and with Other Feeds.

The accompanying table shows that most of the oil meals have a narrow ratio. They may be mixed with feeds of a high ratio such as oaten chaff (1:10) to bring the ratio to correct proportions, e.g., to balance the ration for "producing stock."

### \* \* \* Help Win the War! Buy War Savings Certificates. \* \* \*

ANALYSES OF OIL MEALS AND OTHER FEEDS

Peed	Starch J quiv i Jent	C10de L10tem	Protein I juivi	lat (varies widely)	Ratio P I S b	Price per 100 lb	Price per lb of starch equiva	Price per lb of protein equiva lent	Remarks
	per 1001b	per 100lb	per 100lb	per 100lb		s d	đ	d	
Linseed Meal	74	30	25	6	I 3	9 6	_ I (	46	
Copra Meal	74	20	16	5 9	1 45	6 0	0 97	4 5	At price quoted cheaper than oats and whi it and about as cheap as maire even as re lards starch equiva
Peanut Meal	73	49	43	- ,	1 17	( 6	11	18	At price quoted the cheapest of the oil meals
Cottonsecd Meal	70	45	38	8	x 18	9 6	16	3	As cheap as mest meal as proton source at price quoted
Palm Kernel Meal	73	- 1(	11	6	I 5				7
Sova Bean Meal	- ()	43	37	6					At present only used in compound meals and not available in large quantities
Sunflower Seed Oil Cake	79	35	32	18	1 25				
Bran	44	14	11	4	1 31	6 0	1(	6 5	At prices gueted mest oil meals can economi- cally replace some of the bran in poultry and cattle rations
M tize	78	10	8	14	1 10	5 10 (3s 6d bus)	0 9	8 7	At prices quoted maire is cheaper than wheat as pig fattener
Oats (Algerian)	60	9 5 (v irres with variety)	7	(	1 85	7 ( (35 b 15)	15	13	At pries quoted cil meals cheaper as cattle feed
Wheat	72	(varies with variety)	10	2	1 72	(45 bus)	I 1	77	Sime oil meals cheaper even as source of starch equivalent
Meat Meal	ie	(0	42	1)	1 16	1, 6	1)	3	At prices quoted pennut and cettonseed meal could economically be substituted for a me of the meat meal in pig rations

The table also enables a omparison of the protein equivalent fat and starch equivalent values of various concentrates

The ruling average prices of the feeds at the time of writing (August 1941) are quoted and from these the price per lb of starch equivalent and the protein equivalent (the true value of the protein in a feed) have been calculated. Thus lineed meal has a protein equivalent of 25 per ent and is worth 05 6d per 100 lb the price per lb of protein equivalent is obtained by dividing the price by the protein equivalent 10 95 6d is divided by 25 and the result is 45 6d.

It may be een that some feeds are cheaper than others as sources of starch equivalent and/or protein equivalent. Thus at the pieces quoted maire is cheaper than linseed meal as a source of starch equivalent but dearer as a source of protein equivalent while peanut meal is cheaper than oats both as a source of protein and starch equivalent.

The farmer may advantageously compare prices by reducing the price of feeds to the cost per 100 lb or if he does not desire to do this he may determine the cost of 1 lb of starch equivalent of virious feeds by dividing the price (per bushel or per hundredweight as shown) by the figure given below for each feed

Maize (price per bus)	44
Wheat (piace per bus)	44
Oats (price per bus)	24
Bran (piice per cwt)	49
Pollard (price per cwt)	66
Hay (price per cwt)	41
Good lucarna hour (nous, nor out)	

Good lucerne hay (price per cut) 50 Other practical considerations as ease of feeding palatability and ease of digestion etc must of course be taken into account Thus oats is a much more palatable and digestible feed for horses. However it is readily seen that on the whole oil meals are at least comparable with (Continued on page 50)



# THE MONSTERA DELICIOSA.

H. W. EASTWOOD, H.D.A., Special Fruit Instructor.

The monstera deliciosa is an evergreen plant of the Arum family, and a native of Mexico. This uncommon vine is frequently grown in the gardens of the North Coast for ornamental purposes rather than fruit production, but it produces a unique edible fruit. It is more suitable for garden cultivation than commercial planting, and its production is more on these lines, hence it is marketed only in limited quan-

tities, and, therefore, not often seen in fruit shops.

It grows luxuriantly in a moist and hot climate with good rainfall when planted in a sheltered position in a well-drained, rich, deep loamy soil, but it is fairly hardy, and will do well under less congenial conditions, though it does not attain the same size and is not as prolific. It has adapted itself to a wide range of conditions, and even grows in the coastal districts as far south as Sydney.

In the tropics it commences fruiting a few years after planting. This plant is readily propagated by stem cuttings or sets similar to sugar cane. Each cutting should have

two or more segments or buds, which are planted lengthways where the vines are required, and covered with a few inches of soil. Occasionally seeds are produced in the fruit and seedlings can be raised from them, but this is seldom done.

The vines will cling to any suitable support by numerous strong aerial roots, and they are often planted alongside fences, stone walls or buildings. Frequently this vine is grown without any

support, when it forms dense mats many feet in diameter. The plants are vigorous, scrambling climbers with long large, broad, perforated petioled, and incised leathery leaves, 2 feet or more in length. The more in length. petioles are even longer than the leaves.

The flowers can be likened to the Arum lily, but they have a green spadix enclosed in a waxy white spathe (see illustration). These appear in March or April, and the spadix develops into a large fruit, the size and shape of a cob of corn, but green in colour. The fruit is ready to pick about twelve months after blossoming, and fully developed fruits and flowers are often



The Flower of Monsters Deliciosa. . Green spadix enclosed in a waxy white spathe.

seen on the vines at the same time. The stem of the fruit is about q inches in length, and is retained on the fruit when harvested by cutting it close to the vine.

Reliable indications that the fruit is fit to cut are a change in the ground colour from green to a lighter hue, and the interstices between the



Mass of Vine, Showing Perforated Leaves.

scales beginning to open and show a paler colour. The fruit is not fit to cat when picked, as the hexagonal scales have first to fall off, which is a sure sign of ripeness. This happens gradually from the base upwards, and may extend over five or six days before the top of the fruit is properly ripe. Sometimes the stem of the fruit is placed in water to help ripening, but more often the fruit is wrapped in paper to obtain a more uniform ripening of the whole fruit

Fruits can be kept for several days in a refrigerator and eaten a little at a time. The pulp of the fruit is arranged in hexagonal tubes attached to the core, and when soft has a delicate odour and an agreeable, sweetish taste. The monstera deliciosa is also known as the "fruit of all nations," as it is claimed that several flavours which resemble other fruits, particularly tropical ones, can be tasted in the pulp.

This fruit contains crystals of calcium oxalate, which sometimes causes a burning sensation to the throat and tongue of some people, and for this reason it is not liked by everyone. Most people, however, are partial to this fruit, and it is popular in fruit salads

For marketing, monstera deliciosa should be cut as described previously, graded to size and shape to facilitate packing, and space packed in half-bushel cases, leaving about 4 inches of the stem on the fruit. It is advisable to mark the number of fruits on the outside of the case.



Fully-grown Fruit, Fit to Pick. Also Young Fruit and Flower.

Payable prices are received for this fancy and unusual tropical fruit, which is used by fruiterers for display purposes before being sold.

The monstera does not, as a rule, receive any cultural attention even when it is grown for fruit. This is a mistake, as the vines respond well to cultivation and attention, which improve both vigour and cropping capacity.

# The Drying of Pears.

THE Williams or Bartlett is the only pear variety dried commercially. The fruit should be held in boxes and the ripe fruit sorted for drying every few days. Fruit for drying should be fully eating ripe, very large pears being avoided as they take too long to dry

The fruit should be cut in two and placed, cut side upwards, on the wooden drying trays, then

sulphured. Pears do not absorb the sulphur fumes readily, and to obtain a good coloured article it is necessary to expose to the fumes for 18 to 20 hours, sometimes necessitating recharging the sulphur chamber after about 12 hours, using sulphur at the rate of about 1 lb. to 200 cubic feet of space for each charge. To test whether the pear is sufficiently sulphured lift a

fruit from a tray and feel the portion that was resting on the tray. If this portion is spongy, it indicates that the fruit is sufficiently sulphured. If on the other hand hard portions are felt under the skin, the fruit should be replaced in the chamber and sulphured again.

When sulphuring is complete, the trays of fruit are stacked in such a manner that the air will pass freely through the trays, the top tray being covered by an empty tray to shade it from the sun, or the trays may be placed on a drying rack and protected from the sun by the hessian curtains.

Pears wholly dried in the shade, dry a pale translucent colour, which is preferred by the trade of it is desired to hasten drying, the fruit can be exposed to the sun by spreading the trays after the fruit is partially dried in the shade, but exposure to the sun in this way will result in a golden brown colour.

Pears, being a very fleshy fruit, take four or five weeks to dry. When partially dry, drying can be completed in an evaporator.

# Of Interest to Irrigators.

## Questions Answered on Irrigation Terms and Practices.

(Concluded from Vol. 52, page 638.)

C. J. HORTH, II.D.A., Fruit Instructor.

THIS article commenced in the October issue, and the purposes have been to answer the questions that most commonly confront the irrigation farmer in regard to the effects of applying water to the soil, and also to define the terms used to describe various soil conditions and practices related to irrigation.

What is the effect of plough sole?—Plough sole is the result of over-pulversation of the soil and loss of organic content. Irrigation in conjunction with frequent tillage of a bare surface disintegrates the aggregated soil particles, and the finer material collects in the soil layer just below plough depth. This compacted layer effectively reduces acration and affects the soakage rate considerably. Fig. 1 shows the poor penetration under six furrows after forty-eight hours' soaking. After lying idle for six winter months the same block was flooded by contour check, and Fig. 2 shows the depth of penetration seven days after the application of 3 inches of water. Plough sole was still present to some extent, but it is at once apparent that it is not necessary to resort to mechanical means of correction; it is better to break the packed layer by means of water and crops.

Does tillage conserve moisture?—Evaporation occurs from the surface soil whether it is tilled or not, and the main loss of moisture from below the depth of evaporation is through weeds, thus any operation which controls weed growth will conserve the available moisture in this zone; till-

ing the bare, loose soil may even result in extension of the depth of evaporation.

In soils liable to deep cracking, blocking of the larger openings will save some of the lower moisture, but it is better to take measures to correct the tendency to deep cracking than to indulge in too frequent stirring of the soil surface.

Constant tillage not only destroys soil condition; it also extends the "lag"—the time between application and response by the tree, which is also the time required for applied moisture to reach equilibrium.

What is the "lag" in irrigation?—When water is applied to the soil, its movement is mainly downward, and though uniform penetration seldom occurs in structured soils, there is a more or less irregular zone of saturation, the depth of which is dependent on the amount and rate of application at the surface. The irrigation "lag" refers to the time this moisture takes to reach equilibrium in the root zone; it varies under different conditions and has been stated to be three to four days under a lucerne field, and longer under a clean surface. Actually, temporary water-logging occurs, with exclusion of most of

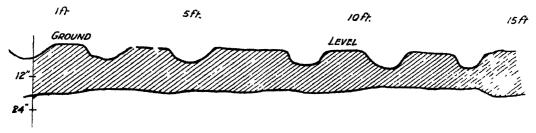


Fig. 1.—Penetration of medium loam soil, under Furrows, after 48 hours Soaking.

the air from the root zone and until equilibrium is reached there is no response by the trees. It can thus be realised that trees may be in a condition of protracted wilting for some time after irrigation, and any practice which tends to reduce the approach to equilibrium is to be encouraged—and wice-versa

There is a capillary fringe above and below the level of water in a test well but capillary movement in a soil at or below field cipacity, is of

moisture, temperature, etc.—influence the rate of nitrate formation, but the quantity of nitrates available for the plant depends largely on the amount of organic matter present

Green crops do not add much permanent humus, though they can supply a considerable amount of nitrogen fibre is essential for maintinance of organic content, and if it cannot be grown and matured it should be supplied from some outside source.

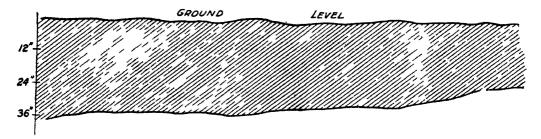


Fig 2 Penetration of same area six months later after application of 3 inches of Water by Flood Irrigation

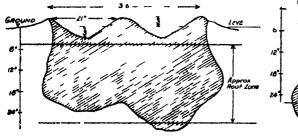
little significance. Once the approximate equilibrium has been reached further movement of water between soil particles does not occur and the main loss of moisture is either from evaporation, or transpiration through the plant. Water does not move to the roots the roots move to the moisture but they will not extend to deeper soils if moisture is withheld from the surface and there is no moisture below. Deep rooting cannot be encouraged unless the plants have that natural tendency and are given some inducement to exploit it.

What is the significance of organic matter?—Besides absorbing the stresses of tillage organic matter provides the plot with introgen and other elements. As a surface mulch it reduces radiation and sun scald and minimizes the effects of flood irrigation by reducing the tendency of heavier soils to surface cracking. It provides the medium for the development of the soil bacteria but its relative content of carbon to nitrogen determines to some extent whether the soil receives or loses introgen. Other conditions—

What is the relation between shoot, leaf and root development?—While each portion of the tree curies on a particular function each of these functions is directly sociated and any interference with one visibly affects the others—though any effect on the root system is not manifest in itself without actual exploration

The ab orbing roots upply the tree with moisture air, and soluble plant food and my deficiency or excess of these becomes apparent in restricted or abnormal growth poor fruit development and peculiar leaf symptoms

Leaves are most important to tree development, for in addition to breathin, and the transpiration of moisture they are also the means whereby the tree makes use of similight in the manufacture of starch (or cirbohydiatis). Reduced leaf surface means less starch formation, and thus restricted growth in both shoots and roots and less stored reserves. Likewise my restriction of the root system causes a corr sponding reduction in the top growth.



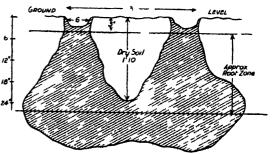


Fig 5 -- PENETRATION IN RELATION TO SIZE AND POSITION OF FURROW

Soil I rofti b 72 hours after irrigation grade of furrow 3 inches per chain

Left — Time of irrigation 3 hours 85 per cent of root zone irrigated r per cent moisture below root zone

Right —Time of urigation 6 hours, 50 per cent of root zone irrigated, 50 per cent of moisture below root zone



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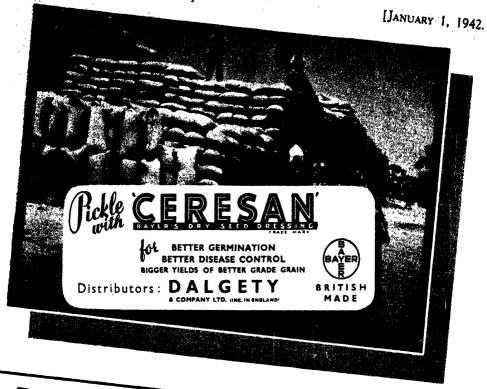
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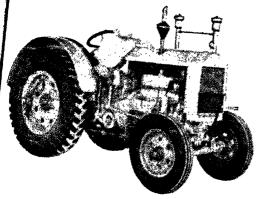
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Knowledge of such an association is a guide to pruning practice, on both healthy and declining trees. Reserve plant food is stored within the shoots and limbs and "heavy" winter pruning reduces this reserve and results in slower growth in both shoots and roots during spring. In many cases it is necessary to cut hard at the winter pruning, but it should be borne in mind that the more food reserve cut away the smaller the resultant growth. Similarly, reduction in the root system as a result of adverse conditions should be followed by a reduction of top growth in order to maintain the right balance between root and top. Where loss of leaves occurs, measures should be taken to prevent an accumulation of excess moisture and its dire consequences. Dewater such trees and reduce subsequent irrigations.

Is it essential to irrigate as frequently after the crop is off as before?—No general statement can be given to cover all fruits; the crop, its season of maturity, the capacity of the soil for water and seasonal conditions, must be taken into consideration.

The tree should not be allowed to go short of moisture during the approach to harvesting, and though the greatest growth will result from the maintenance of an adequate supply of available moisture at all times, it is better to forego this maximum result and allow the soil to approach the wilting point on occasions. A continuously moist condition in the root zone is excellent for the maintenance of soil inhabiting root rots, which, while not adversely affecting the vigorous tree during normal conditions, are nevertheless capable of causing major damage during periods of unfavourable weather. An occasional drying out prevents this building up of the fungal population and gives the vigorous tree greater chances of withstanding occasional, adverse seasonal conditions.

Is irrigation during blossoming harmful?— Shortage of moisture during blossoming should be avoided at all costs; see that adequate moisture is present prior to bud swell. Should irrigation be necessary during blossoming it would be unwise to withhold it, though in older plantings on heavier soils with an extended "lag," heavy applications should be avoided, for the absence of air around the roots for a few days would have exactly the same effect as the withholding of moisture. A light irrigation would be preferable under such conditions, to be followed by a normal application at a more opportunie time.

Has late autumn irrigation any dangers?—Weather conditions are, unfortunately, as yet unpredictable with any degree of accuracy, and the principal danger lies in the possibility, that following heavy rain, the root zone may be saturated for an extended period when transpiration is low. The best safeguard is to have a standing crop of some kind or other through the winter months. Late autumn irrigation may be satisfactory on empty land should heavy rain not follow too soon afterwards, but from May onwards the soil loses its warmth, and it is difficult to obtain much growth from late planted or germinated seed.

Obtain satisfactory growth of the autumn cover crop before the winter, even though two or three light irrigations may be necessary, and in the event of late autumn or early winter rains the standing crop is a far better assurance against root injury than empty ground. There may be little variation in the actual height of water as shown in the test wells, but the saving fact is that the soil moisture content above this level is reduced and this ensures a better air supply for the roots and prevents suffocation.

Dry soil conditions during autumn and winter check development of the buds and lower the resistance of the trees to frost; avoid a protracted dry spell followed by copious irrigation, for such a practice may lead to autumn blossoming and loss of subsequent crop.

# Prunes at Yenda.

## Results of Irrigation and Soil Management Investigations.

(Concluded from Vol. 52, page 588.)

F. T. BOWMAN, Ph.D., B.Sc.Agr., Fruit Research Officer; and J. R. DAVISON, Fruit Inspector.

IN the first portion of this article (October issue) the poor cropping of prunes on heavy soils at Yenda was shown to be related to faulty conditions of tree growth, capable of improvement by the use of suitable irrigation and cultural practices. In a subsequent issue the practical application of these methods was discussed, and in this concluding portion the effects on the soil and the trees, of the soil management methods recommended are dealt with.

# Adjustment of Irrigation to the Native Cover System.

Before the method of native cover cropping is adopted, it will be necessary, on most farms, to examine the ditches and levels to see if they are suited to the new conditions. Alterations in the grades can be carried out later in the year, but, unless it be unavoidable, should not be carried out during the blossom and setting period, when

it may adversely affect fruit set, or during the winter, when it will interfere with the cover crop. Alterations to ditches can be effected best when they are just in good condition to plough, so that any paspalum clumps, etc., will not be over-difficult to uproot.

The new conditions affecting irrigation to be borne in mind are:—

1. The flow of water along the lands will be slowed down by the presence of cover crops

during the spring-early summer period, and again in the late summer-autumn period of each season.

2. The permeability of the soils will be im-

proved.

These altered conditions will, in some cases, call for adjustment of levels (by grading) and the length of furrow-run or bay. More often, however, on the heavy soils under review, cleaning and increasing the height of ditch banks to secure greater head of water will compensate for the slowing down of the flow of water, the existing ditches on many farms being at present too low to give the required flow. "Fill" rather than "cut" ditches are preferable where they can be had, to obviate "dead" water and the accompanying weed growth. In some cases checks may be introduced at suitable distances along the ditches with advantage.

#### Effects on the Soil.

During the past two seasons cultivation has not been practised on the experimental block, except for some specific purpose, such as putting in furrows, or discing, in preparation for the prune drop. During the past two winters the native burr clover has been allowed to grow, and except for the need to grade and to raise the banks of the ditches just described, the native clover crop system would have been in complete operation.

The effects of this system have already been observed in a much more ready and deeper penetration of irrigation water. This is secured without the lengthy period of saturation of the top soil, which occurred when this land received

# NOT NECESSARY TO REGISTER ORCHARDS.

It is no longer necessary to register orchards, nurseries or banana plantations under the Plant Diseases Act, 1924.

This decision is in accordance with recent vote of orchardists against continuance of registration of orchards and nurseries.

much cultivation. It is therefore apparent that a considerable improvement in tilth and texture has been brought about during the past two seasons, amounting perhaps, to a restoration of the structure natural to this soil.

An important effect upon the trees also has become apparent, namely a reduction of the "lag" in the response of the trees to irrigation. This is probably due to the two effects upon the soil just referred to, viz., greater permeability, and reduced period of saturation during irrigation.

#### Lag in the Response to Irrigation.

While the soil is in a saturated state during an irrigation, and until free water has percolated to deeper soil layers, bringing about the condition known as "field capacity," trees often have the appearance of not benefiting from the application of water. The duration of this lag varies from one to several days, during which time the trees remain as they were just prior to irrigation.

The lag is possibly connected with the altered conditions of soil aeration consequent upon the period of saturation. It is more apparent in heavy soils that have been clean cultivated over a period of years, than on lighter soils. The lag appears longest in soils, and parts of orchards such as the "low spots," where the soil is either naturally dense, or has been compacted by excessive cultivation. The duration of the lag in these several instances, corresponds with the period of saturation.

A further effect upon the trees in cover crop on heavy soil, is that they appear to show less stress during the last few days of the irrigation interval. This effect, coupled with the reduced lag at the beginning of the irrigation interval, represents several days of improved growing conditions. Such growing conditions are particularly important during the height of the summer, and possibly account for the observation recorded earlier that the crops and foliage of prune trees grown under this system, appear to withstand the summer heat much better than many others in the district.

#### Principles underlying the Cover Cropping System of Soil Management.

The effects obtained from the cover crop system of soil management, using native burr clover, are due to the application of two principles, namely:-

- 1. A minimum of cultivation.
- Cover to the soil during the period of growth of the crop and the death in situ of the roots.

When put into practice these principles differ in many particulars from green manuring.

A minimum of cultivation is desirable for two In the first place, cultivations main reasons. having the sole object of creating a soil mulch are profitless, because the idea that soil mulches conserve moisture is erroneous. There is ample scientific evidence that soil mulches, produced by cultivating the soil, do not save or conserve soil moisture. After an irrigation, the moisture in the top few inches of soil naturally evaporates and cannot be conserved except by a mulch introduced and superimposed upon the existing soil. This loss of surface soil moisture occurs during a short period after the irrigation water disappears from the surface, the soil below these surface few inches being at field capacity. Over a period of some months, if the surface soil were undisturbed and the evaporating conditions were high, this deeper soil would gradually lose its moisture by evaporation. But in the comparatively short interval between irrigations practically no moisture is lost in this manner, but is drawn upon by the plant roots. The main loss being by this means, soil mulching cannot conserve the moisture of the rooting zone of the trees and, therefore, unless it destroys weeds, or has some other purpose, it is profitless.

(Continued on page 48.)

# PEANT DISEASES Notes contributed by the

# Plant Quarantine.

Biological Branch

## An Important Measure of Disease Control.

Many growers probably do not realise that several of the serious plant diseases which cause havoc in overseas countries have so far failed to appear in Australia because of the existing Plant Quarantine Regulations and the vigilance exercised by those who inspect and examine material as it arrives from abroad.

The organisation and control of all quarantine in this country were originally functions of each individual State, but in 1909 the Commonwealth assumed the responsibility for the control of foreign quarantine, and utilised the existing State organisations for the administration of both animal and plant quarantine regulations. Even at the present time the Commonwealth is still mainly dependent upon the co-operation of the States, although the Quarantine Act of the Commonwealth is actually administered by the Commonwealth Department of Health.

#### Aim to Exclude Pests and Diseases.

The Act, insofar as it affects plants, is concerned mainly with the exclusion of diseases and pests from the Commonwealth, but it also makes provision for the promulgation of regulations to check the spread of diseases and pests already established within Australia.

A Federal Director of Plant Quarantine was appointed in 1927, and he is responsible to the Director-General of Health, Canberra. No other full time officer has since

been appointed to the Commonwealth Service for plant quarantine work. All other officers that administer the Federal regulations are appointed at the request, and on the recommendation of the State Departments of Agriculture, and from the services of these Departments. Actually they are State officers seconded for Commonwealth service, and the Commonwealth pays the States for the services rendered. In all, there are approximately 100 quarantine officers engaged in inspection duties for the Commonwealth.

#### Some Diseases Excluded.

There is little doubt that untold benefit has resulted in the past from the present quarantine system. It has assisted in preventing the establishment in Australia of such major plant diseases as citrus canker, fireblight of apples and pears and potato wart, quite apart from certain insect pests and weeds.

It is obvious that no plant quarantine service can be expected to keep out all plant pests, weeds and diseases, and it has to be

admitted that such troubles as bacterial blight of tomatoes, bean blight and leaf mould of tomatoes have become established here in spite of the quarantine system.

#### A Report to the Agricultural Council.

Having in mind the need for reviewing the existing system of foreign plant quarantine in this country, the Agricultural Council directed some time ago that a conference of Commonwealth and State officers should be called to discuss the position and submit a report embodying recommendations for improvement in the organisation and administration of the present system.

Delegates from all States conferred with the Commonwealth authorities at Canberra in April-May, 1941, and a report containing twenty-six resolutions was then submitted to the Agricultural Council. The report dealt with such matters as appointments to staff, training of inspectors, funds, standardisation of methods of inspection, data of life-histories, &c., of pests and diseases likely to be introduced from overseas, lists of hosts on which pests and diseases might be introduced, need for modifying existing regulations and promulgating new ones, licensing of nurserymen, growth of imported plants in quarantme, revision of treatments for plants and goods introduced, education

of public re danger of indiscriminate plant introduction, inspection fees, equipment for vacuum fumigation, establishment of plant introduction stations, methods of coping with new outbreaks of diseases and pests, possible dangers of pest introduction by aeroplanes, sampling methods and germination standards for seeds, etc.

It is of interest to note that the plant quarantine report prepared in 1940 by the Australian Institute of Agricultural Science and published in the *Journal* of the Institute for December, 1941, provided the basis for discussion at the outset of the Canberra conference, and many of the items in the Institute's report were adopted for inclusion in the recommendations to the Agricultural Council.

One recommendation, "That an advisory plant quarantine committee be appointed in each State to review from time to time matters of plant quarantine, and that the reports be transmitted to the Commonwealth Quarantine Administration," was recently implemented in New South Wales, and two or three meetings have so far been held, the personnel of the committee comprising the following officers of the Department of Agriculture:— Mr. C. G. Savage (Chairman), Dr. H. J. Hynes, Mr. T. McCarthy, Mr. J. N. Whittet and Mr. D. D. Atkins.

#### Peach Brown Rot.

#### Pre-harvest Sprays for Mid- and Late-Season Varieties.

Hump weather during January and February is frequently accompanied by epidemics of brown rot in the choice dessert peaches and nectarines ripening in these months. The disease is caused by the fungus Sclerotinia fructicola, carried over in mummied fruit rotted in previous seasous, in diseased twigs and blossom remnants, and by individual spores resting on bark surfaces within the tree.

Orchard sanitation measures are most important in order to reduce the spore load in the orchard. Provided due attention has been paid to sanitation, the orchardist may expect to benefit from fruit cover sprays applied a few days prior to commencement of harvesting each variety.

In the coastal, tableland and slopes districts, where the dessert varieties are grown and brown rot is important, copper sprays cannot be applied to peach or nectarine trees in leaf without severe leaf injury; therefore, Bordeaux mixture and the various proprietary copper sprays should be avoided for this purpose.

However, sulphur materials are safe for pre-harvest purposes, provided suitable dilution rates are observed. The following sulphur sprays have been used with satisfaction:—

Lime sulphur\*, 1 gallon to 160 gallons of water (i.e., 1 pint to 20 gallons water).

<sup>\*</sup>Commercial liquid lime sulphur containing approximately 20 per cent. polysulphide sulphur W/V.

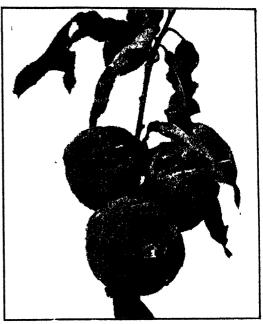
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Colloidal sulphurs, 1 lb. to 2 lb. per 100 gallons of water.

Wettable sulphurs 5 lb. per 100 gallons of water.

A combination of lime sulphur with either colloidal sulphur or wettable sulphur is also a recommended spray. It consists of lime sulphur I gallon to 320 gallons water (1.c., 1/2 pint to 20 gallons) plus either colloidal sulphur I lb. to 100 gallons or wettable sulphur 5 lb. to 100 gallons. This mixture combines good coverage and low potentiality for polysulphide injury, with a reasonably high sulphur content.

It is recommended that an efficient wetting and spreading agent, of which various commercial types are available, be used with each of the above sulphur sprays. Even wettable sulphur appears to contain, at times, scarcely sufficient wetting agent to ensure a good spray cover.



Peaches Destroyed by Brown Rot.

#### The Citrus Nematode.

CITRUS roots are immune to attack by the root knot eelworm (*Hetcrodera marioni*), but are very commonly infected with the citrus nematode (*Tylenchulus semipenctrans*). This is a minute, worm like organ-

ism which parasitises the young fibrous roots. It is of world-wide distribution and, as far as is known, attacks only citrus and closely related species of plants.



Fig. 1.—Female Citrus Nematode attached to surface of Citrus Root.

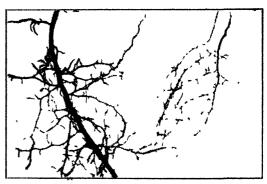


Fig. 2.-Citrus Roots.

Left —Showing thickened appearance due to the adhesion of a layer of soil particles around roots infested with nematodes Right.—Normal. [After Fauvett.]

It differs in its action from the root knot eclworm by not forming galls. The young fibrous roots are attacked by the larval females, whose heads become permanently embedded in the outer root tissue. The test of the body remains outside as a swollen.

somewhat curved structure (Fig. 1) with a small conical tail. A very high-powered lens is necessary to see these female nematodes on infected roots. Eggs are laid in the soil adjacent to the roots, and are embedded in a gelatinous material which causes a layer of soil particles to adhere as a coating around the roots, giving them a thickened appearance (Fig. 2).

Infestation is usually most severe in light sandy soil, presumably because movement of the parasite is impeded to a less extent than in heavy soil, but severe infestation can, and does occur in heavy soil, and the effects on the trees often seem more noticeable.

The effect of nematode attack on the general health of the tree is still a matter of debate. It seems fairly certain that a very heavy infestation is a contributory factor in some cases of unthriftiness, but trees which are well tended may be heavily infested and yet carry good crops.

#### Control.

The only method of control which can be recommended is to encourage rapid growth of fibrous roots by suitable manurial and cultural treatments. The incorporation of animal manure in the soil appears to exert a particularly beneficial effect.

How long the nematode may persist in the soil after the removal of affected trees is not known, but field experience suggests that they may do so for some years. For this reason, therefore, young trees should not be planted immediately in soil from which badly infested trees have been removed, but an annual crop should be grown before replanting.

#### New Diseases.

IDURING November, 1941, the following diseases were recorded for the first time in New South Wales:—

Powdery Mildew of Ranunculus (garden hybrids).—Metropolitan. Caused by Oidium sp.

Powdery Mildew of Papaw (Carica papaya).—North Coast. Caused by Oidium sp.

Mosaic (virus) of Guelda rose (Viburnum opulus).—Oberon.

BACTERIOSIS OF APRICOT (Prunus armeniaca).—Goulburn. Pathogen under identification. Symptoms—Blossom blight, tip-wilt, leaf spot, twig and limb cankers with gumming.

RUSTY SPOT\* OF PEACH (Amygdalus persicae).—Glenfield. Cause unknown. Although this condition has not previously been recorded, specimens showing the abnormality were first collected in 1933-34 and have since been observed from time to time

# Prevention of Spotted or Bronze Wilt of Tomatoes.

VERY promising results are being obtained in the experiment which is being conducted at Hawkesbury Agricultural College on the control of this disease. The method being tested consists in spraying the plants from the very early seedbed stage onwards with a solution of tartar emetic and sugar. This acts as a poison hait for the small flying insects—thrips—which carry the spotted wilt virus to tomatoes from infected weeds and other plants.

In the plots which have not been sprayed, more than three times as many bronze-wilt plants have occurred as in the plots which have been sprayed with the bait twice each week, and more than two and a half times as many as in the plots which have been sprayed once a week. The crop was in the second week of picking at the time this was written (18th December, 1941).

was written (18th December, 1941).

Although the experiment is incomplete, the results so far, which represent a 60 to 70 per cent, degree of control, are sufficiently encouraging to draw the attention of tomato growers to this means of reducing losses before mid-season

and late crops are planted Even if a small quantity only of tartar emetic, say, I ounce, is available, it would be useful for protecting seedlings while in the seedbed

The formula used in the experiment at Hawkesbury College was 2 oz. tartar emetic and 4 oz. sugar in 4 gallons of water. For seed-bed use this formula may be converted as follows:—Dissolve I ounce tartar emetic in I quart of water and hottle as a stock solution. Take 4 fluid ounces (½ cup) of the bottled fluid and add water to make up to 32 ounces (approximately 1½ pints). Add one moderately well-heaped teaspoon of sugar.

The spray may be conveniently applied to seedlings or small plots of tomatoes by means of a "fly-sprayer." The aim is to apply a fine mist to the plant and for economy the nozzles of spray pumps should be reduced in size for field application.

The experiment at Hawkesbury Agricultural College is under the supervision of Messrs. C. J. Magee, W. L. Morgan and A. N. Johnston.

<sup>\*</sup> Blodgett, I ( Rusty Spot of Peach Plant Disease Reporter 25 I, pp 27 8 1941

# Black Rot of Garden Stocks.

# Clean Seed is Most Important.

R. D. WILSON, M.S., M.Sc.Agr., Plant Pathologist.

BLACK rot of garden stocks, which was first recorded (\*) in New South Wales in 1938, is now the most important disease of this popular ornamental in this State and one of the most serious diseases with which commercial flower growers have to contend. The disease is caused by a strain of the cabbage and cauliflower black rot organism Bacterium campestre. It has been shown, however, that the bacterium causing the black rot disease of stocks will not infect cabbage or cauliflower or vice versa.

The first observable symptom is usually a yellowing of the lower leaves, often accompanying a stunting of the plant. Black, somewhat watersoaked markings develop on the stem, particularly at the points of attachment of the leaves. Internally there is a browning or blackening of the tissues which may be confined to the waterconducting tissues, but which may extend out into adjacent tissues. Young plants severely affected usually collapse and die, but older plants or plants not so severely affected, though stunted, may survive and produce flowers.

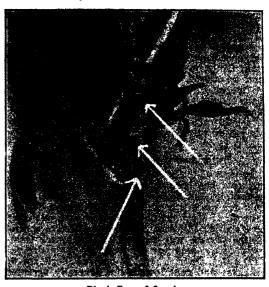
#### Disease is Seed Borne.

Two of the most important features in the life history of the disease are, firstly, that the disease is carried by the seed and, secondly, the rapidity with which the disease spreads under seed-bed conditions.

That the disease is seed borne has been demonstrated by Kendrick (2) in California and by the writer, both by the isolation of the causal bacterium from stock seed and by the development of the disease in plants grown in previously sterilised soil from seed harvested from diseased plants. It has been the experience of several commercial stock growers in this State that seed harvested from healthy plants produced healthy stocks, whereas when bought seed was used the resulting seedlings were frequently affected with black rot.

#### Seed Bed Spread.

Clayton (1) has emphasised the importance of seed-bed infection in the case of black rot of cauliflowers. That seed-bed spread is also a very important factor in the black rot disease of stocks became apparent during the course of several seed treatment experiments in which the plants were grown both in outside seed beds and in pots in the glasshouse.



Black Rot of Stocks.

Arrows point to the black sunken areas where subsidiary stems joined the main stem.

In several cases in the outside seed beds it was found that many plants on one side of the seed bed had developed symptoms of black rot whilst there were practically no diseased plants on the other side of the bed. In the pot tests, where it was the practice to plant the seed in batches of 100, consisting of twenty seeds in each of five pots, it frequently happened that one black rot infected plant would be recorded amongst the plants in a set of five pots. After recording the occurrence of this diseased plant, including the position of the pot in which it was growing, the plant would be removed. Two or three weeks later several more diseased plants might be recorded, and almost invariably the majority of these plants would be found in the pot from which the diseased plant had previously been removed. This occurred so frequently that there appeared to be no doubt whatever that a considerable amount of spread from plant to plant was taking place similar to that which was observed in the outside seed-beds.

It is considered that this seed-bed spread, following the use of diseased seed, explains the high percentage of infections observed during the last three years in many commercial plantings of stocks.

#### Effect of Date of Planting.

Field observations and reports from both commercial flower growers and home gardeners have shown that severe losses from black rot are much more frequently experienced by the former than the latter. It seems likely that the main reason for this difference lies in the dates of sowing. In an endeavour to produce flowers at a time of the

year when stocks and other flowers are scarce, commercial stock growers usually plant their seed some time between December and February, whilst most home gardeners sow their seed in the period February to May Temperatures, particularly whilst the plants are in the seed bed, are thus usually considerably higher in the case of stocks grown commercially than where they are grown in the home garden. There is not yet conclusive evidence that temperature is the main factor involved in the differences in infection associated with date of planting, but it is of interest to note that Clayton (3), working on Long Island. New York (U.S.A.), found that temperature was one of the most important factors influencing the development of the black rot disease of cauliflowers.

#### Experiments on Seed Treatments.

In view of the seed-borne nature of the disease. attention has been directed to the possibility of controlling the disease by seed treatment. The only reference concerning seed treatment for the control of black rot of stocks is that published by Kendrick (2), who stated that effective control of the disease was secured by hot water treatment of the seed for ten minutes at 5.3 deg C (1274 deg. Fahr) In the case of black rot of cabbages and cauliflowers the generally accepted seed treatments are twenty-five minutes in hot water at 50 deg C. (122 deg Fahr) for cabbage seed and eighteen minutes at the same temperature for cauliflower seed. Treatments for thirty minutes in a 1 in 1,000 corrosive sublimate (mercuric chloride) solution have been claimed to give satisfactory control of black rot of cabbages, whereas Clayton (1) did not obtain control of the disease on cauliflowers by this treatment, ascribing the differences in results to the fact that, in cauliflowers, which are more susceptible than cabbage, there is a greater amount of internal seed infection not eliminated by the corrosive sublimate treatment.

#### Details of the Tests.

Most of the experiments conducted in the present instance have included hot water and corrosive sublimate treatments; two experiments have included dusting with Ceresan, and in others various bleaching powder (calcium hypochlorite—frequently referred to as chlorinated lime) solutions were employed. Bleaching powder solutions have been used by White (\*) and Stevenson (\*) in the disinfection of lettuce seed.

In two cases the seed used was ordinary commercial seed purchased from seed merchants, whilst in all the other experiments the seed was harvested from plants which were inoculated some time before the setting of the seed with a pure culture of the black rot organism. The treatments which have been tested include:—

#### 1. Ceresan.

- (a) Seed dusted with Ceresan (UT. 1875a) at the rate of two parts by weight of Ceresan to 1.000 parts by weight of stock seed (0.2 per cent.).
- (b) Seed dusted with excess Ceresan and the excess dust sieved off.

2. Corrosive sublimate (mercuric chloride).—
Seed dipped for ten and thirty minutes in a
1 in 1,000 solution at room temperature.

#### 3. Hot Water .---

Seed treated for ten and thirty minutes in hot water at both 50 deg. C. (122 deg. Fahr.) and 53 deg. C. (127 4 deg. Fahr.).

# 4. Bleaching powder (calcium hypochlorite).—

- (a) 4 hours in a 7 per cent. solution at room temperature.
- (b) 4, 16 and 24 hours in a 10 per cent. solution at room temperature.
- (c) 4 hours in a 10 per cent. solution at 16.5, 20, 25.5, 30 and 37 deg. C. (61.7, 68, 77.9, 86 and 08.6 deg Fahr. respectively).

The bleaching powder solutions were prepared by adding to one part by weight of bleaching powder 10 or 14 parts by weight of water (10 per cent or 7 per cent solutions respectively). After stirring and allowing to stand for ten minutes, the liquid was poured off and immediately used for the treatment

In these experiments the treated seed, together with untreated seed as a check, was sown either in outside seed-beds (in some instances the seedbed soil had been sterilised with formalin) or in pots of steam-sterilised soil in the glasshouse. In every case special care was taken by wide spacing to prevent spread of the disease from one seed-bed or group of pots to another seed-bed or group of pots. However, the results secured indicated that not only was there spread of the disease within individual seed-heds or groups of pots, but that it almost certainly oc-curred from plot to plot in some of the experiments. The results were, therefore, not as satisfactory as could be desired as far as giving an accurate idea of the effectiveness of any particular treatment However, by taking into ac-count the time of appearance of the disease and the type of severity of the symptoms in any set of seedlings, as well as the number of seedlings developing the disease, it was found possible to obtain an approximate idea of the relative value of the treatments.

#### Seed Treatment Results Summarised.

It is not proposed to give in detail the results of these various seed treatments, but merely to summarise the conclusions which have been reached.

- I. Treatments which proved completely ineffective or nearly so include the two Ceresan dust treatments (0.2 per cent. and excess) and the tenminute treatment in hot water at 50 deg. C. (122 deg. Fahr.).
- 2. Treatments which definitely gave some control but which, almost certainly, did not give complete control include the two corrosive sublimate treatments (ten and thirty minutes in a I to I,000 solution) and the ten-minute treatment in hot water at 53 deg. C.

3 Treatments which certainly eliminated a considerable amount of black rot infection from the seed, and which may have been completely effective, include the two thirty-minute hot water treatments (50 deg and 53 deg. C.), and all the bleaching powder treatments.

From the experiments carried out so far it is not possible to claim that any treatment will completely eliminate the black rot bacteria from infected stock seed. Complete elimination must, of course, be the objective of any treatment, since, as has been indicated earlier, a few infected seeds may serve as sources of infection for many seedlings in a seed-bed. However, because, in most of the experiments so far carried out, there was the possibility of spread from the plants grown from untreated seed or seed ineffectively treated to plants in an effective treatment, certain of the hot water and bleaching powder treatments cannot be condemned at the present stage as not giving 100 per cent. control.

#### Effect of Treatments on Germination.

All the hot water treatments were found to have a somewhat severe effect on germination. This was more pronounced in the case of seed sown in outside seed-beds than in pots in the glasshouse, where conditions were better for germination. On old seed the harmful effect was very evident. For example, on seed which was known to be at least three years old, thirty minutes in hot water at 53 deg. C. gave a germination of 8 per cent. compared with 40 per cent. for untreated seed. On seed which was 1½ years old the same hot water treatment under glasshouse conditions, reduced germination from 81 per cent. (untreated) to 60 per cent. (treated)—average of three separate experiments.

The ten and thirty-minute corrosive sublimate treatments reduced germination under glasshouse conditions to approximately the same extent as did the hot water treatments but were less severe when the seed was sown in outdoor seed-beds.

The sixteen and twenty-four-hour treatments (room temperature) in 10 per cent. bleaching powder reduced germination to about 10 per cent. of that of the untreated seed. The four-hour treatment in 10 per cent bleaching powder solutions at 37 deg C. reduced germination from 83 per cent. (untreated) to 22 per cent. (treated), but none of the remaining four-hour treatments in bleaching powder solutions caused a serious reduction in germination, the average figures being:--Untreated seed, 78 per cent.; four hours in bleaching powder solutions, 70 per cent. Therefore, provided that the temperature of the liquid used in the treatment is kept below 30 deg. C. (86 deg. Fahr.), it is unlikely that serious results on germination would result from a four-hour treatment in 10 per cent. bleaching powder. Taking into account both disease control and effect of treatment on germination, it is considered at present that the best treatment would be a four-hour treatment in a 10 per cent. bleaching powder solution, the temperature of which during the treatment should not exceed 30 deg. C. (86 deg. Fahr.).

#### Recommended Control Measures.

At the present time the following control measures are recommended —

- 1. The use of disease-free seed -- This is most important and in order that growers may be certain that they are using healthy seed, they should, wherever possible, save their own seed from healthy plants. Where it is the practice to grow stocks of separate colours it is advisable, owing to the possibility of cross-pollmation, to plant several small isolated stud seed plots each contaming a separate variety. The seed should be sown directly in these plots with subsequent thinning rather than transplanted from a seed-bed The resulting plants should be kept under close observation for the appearance of black rot and all diseased plants immediately pulled out and burned The seed from each disease-free single-flowered (seed-producing) stock plant should be harvested separately and placed in a separate numbered envelope. In the next season some of the seed from each packet could be used for the main sowing, some for the stud seed plots and some should be kept for use in future years (if re-quired) The sowings in the stud seed plots should be made so that each row or section of a row corresponds to a packet (i.e., a single seed plant of the previous year). If there is any evidence of black rot in any one lot or if the percentage of doubles is low (less than 50 per cent) the whole of the plants in that lot should be removed and the remnants of seed in the corresponding packet discarded. In this manner it should be possible to carry out a programme which will give both black rot-free seed and a strain producing a high percentage of double flowers.
- 2 The use of clean soil for the seed bed -Although there is at present no information available on the ability of the stock black rot organism to live over in the soil, it is most essential that no risk of soil infection should be taken Consequently, the seed-bed should be established on land known not to have grown diseased stocks in previous years, or, preferably, on soil sterilised by heat or formalin. Usually the formalin treatment is the most practicable. In this treatment commercial formalin (40 per cent. formaldehyde) is diluted with water at the rate of one pint of formalin to six gallons of water This is then watered on to the soil at the rate of half to one and a half gallons to the square foot, depending on the amount required to saturate the soil Damp bags are then spread over the surface for twelve to twenty-four hours, after which they are removed and the soil left for about two weeks to allow the formalin fumes to escape before sowing the seed.
- 3. Crop sanitation.—At all times any black rot infected seedlings or plants should be pulled up and burned as soon as observed and, if diseased plants have been grown on any particular area, that land should not again be planted with stocks for at least four or five years

(Continued on page 55.)

# INSECT PESTS.

Notes contributed by the Entomological branch.







# The Pumpkin Beetle.

(Ceratia hilaris.)

This beetle occurs in most coastal and inland areas, but is less prevalent in the southern than the northern parts of the State, where in many districts it is a pest each year in early crops. Every few years, however, there is a general outbreak, and pumpkins, melons, squashes and cucumbers

in most districts are heavily infested. Whilst the pumpkin beetle is primarily a pest of these crops, occasionally, where it has been abundant and dry weather conditions have prevailed, cherries and figs have been damaged and localised losses have occurred.

The beetles attack pumpkins and related cucurbitaceous plants at all stages of growth, the chief damage occurring to the young plants, especially to those just through the ground: these may be destroyed by half-a-dozen beetles in a few hours. In older crops a few individual plants may be badly

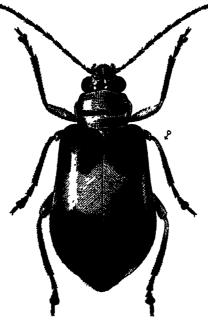
damaged or destroyed, but usually once the plants commence to grow runners, they are able to outgrow infestation. The beetles also attack the flowers and young fruits of pumpkins and squashes and, by continually destroying these, cause additional losses.

The adult beetle, which measures about one-quarter of an inch in length, is of a general

rich orange-yellow colour, with four large black spots on the wing covers. Its elongate form readily distinguishes it from the more or less circular ladybirds, which may be somewhat similarly col-

oured.

The eggs, which measure slightly more than one-fiftieth of an inch in length, are bright orange when first laid, but turn yellowish-brown just before hatching. They are laid singly or in groups, and in the laboratory are laid freely on moist soil. In the field the immature stages have only been found on



The Pumpkin Beetle.

one occasion occurring in the roots and stems of pumpkins. The fully-fed larva measures approximately ½ inch in length, and pupates in the soil at a depth of 1 to 6 inches.

The beetles may live for periods up to twelve months, and egg-laying may extend over several months. The average number of eggs laid by an individual female is about 500. Adult beetles may live throughout the winter and lay numerous eggs the following spring. In the summer the period of development from egg to adult is about six weeks, while in the spring and autumn the life cycle may occupy ten to twelve weeks.

#### Control.

Dust materials have a very pronounced effect upon the beetles, and while the plants are very small they can be protected by a daily dusting with either hydrated lime, a mixture of equal parts of lime and tobacco

dust or flour. These materials will protect the plants for at least a day, but frequent treatment is necessary to protect new growth and also to renew the old dust covering.

When the plants become older and do not require such close attention, individual plants, as they become infested may be dusted with derris dust or a mixture of pyrethrum powder one part and flour four parts. These dusts will destroy numbers of beetles and at the same time prevent reinfestation for one to two days. The use of derris or pyrethrum dusts while the plants are very small and require treatment at least every other day, would be considerably more expensive than the use of the inert dusts already mentioned.

The dusts may be applied by shaking through cheesecloth bags, if dust guns are not, available. Periods when infestation tends to be at its worst are on warm days after rainy or windy weather.

# The Crusader Bug.

(Mictis profana.)

This native species of plant bug, which has a wide range over Australia, has been abundant during the present season, and has been found attacking fruit trees and various cultivated garden plants including citrus, grape, rose, cassia, acacia, etc. Its preferred native host plants appear to be various species of wattles, cassias and eucalypts, and the first record of its occurrence as a pest in New South Wales appears to have been in the year 1896, when it was found injuring citrus trees in the Maitland district.

These bugs grow by a series of moults, and feed by piercing the plant tissues and sucking up the sap. When infesting citrus trees they usually feed on the young shoots a few inches below the tips, thus checking the growth, and causing the young wood to become "scorched," and often to die back to the old wood.

The adult bug, which measures slightly less than I inch in length, is of a general dark-brown or greyish-brown colour, and is winged. On the centre of the back is a well defined, yellow, "St. Andrew's" cross, and it is from this marking that the bug takes its popular name of "Crusader" or "holy" bug. The under surface of the body, the legs and antennae are brown, but in some individuals the tips of the antennae are orange. The hind legs of the males are thickened, and there is a sharp angular projection at about the middle of each hind tibia.

The half-grown bug is brown, and has two small orange spots in the middle of the upper surface of the abdomen; the developing wings or "wingbuds" are also marked with orange, and there is a narrow orange line on each side of the abdomen. The

first stage bugs are brown, but with brighter and reddish coloured abdomens.

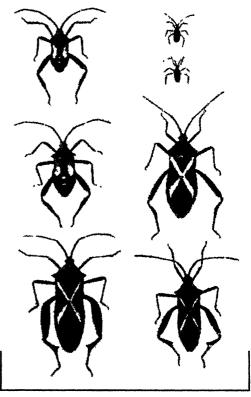
The eggs are relatively large, elongated, brown, with a rounded lid or operculum through which the young bugs emerge, at one end. These eggs are often laid in rows upon the foliage of the host plants, but may sometimes be deposited among debris, etc., on the ground.

#### Control.

Control may be obtained by spraying with a kerosene-pyrethrum emulsion. This spray is prepared by steeping I lb. of pyrethrum powder, overnight, in I gallon of kerosene, and then making up the extract (which should first be strained through muslin) in the manner usually practised for kerosene emulsion. This may be done by dissolving ½ lb. of hard soap in I gallon of heated water and then stirring in and thoroughly emulsifying the gallon of kerosene-pyrethrum extract to form a stock solution.

For use, the 2 gallons of stock solution is diluted with water to make 40 gallons of spray.

If only a few plants are infested, handpicking of the bugs will be sufficient to ensure satisfactory control.



Immature and Adult Forms of the Crusader Bug.
(Actual size)

# A Weevil Pest of Apple Trees.

(Perperus vermiculatus.)

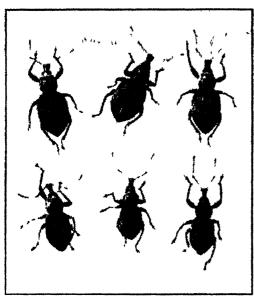
In the Penrose district, New South Wales, apple trees are occasionally damaged by small greyish-brown elephant beetles. These beetles have been identified as *Perperus vermiculatus*, a native species.

The adult beetles appear early in the spring when the apple buds commence to burst, and attack the developing buds and young foliage. Damage of this type would not be very serious to fully-grown trees, unless the population of weevils was abnormally heavy, but on young or reworked trees, considerable injury might be done. In addition to damage to the tops, an examination of the roots of a number of trees disclosed rather widespread injury. This takes the form of pitting and scarring of the root-bark, and occasional shallow

grooves, which are not sufficiently deep to reach the wood. This type of root damage is quite distinct from that of the common fruit tree root weevil, *Baryopadus squalidus*, the larvae of which cause deep, continuous grooves in the larger roots.

In one instance several weevil larvae were taken associated with the pitting, but these larvae failed to complete their development into adults. At the time of the injury a search of the native shrubs and trees around the orchards failed to indicate any alternate host. The weevil was apparently confined to the orchard.

The adult weevils are greyish-brown. The females are rather broad and measure slightly less than ½ inch in length. The males are narrower and smaller, measuring



Adults of the Weevel Attacking Apples.
(I played twice)

About —1 emales Below —Makes

only \( \) inch in length. These weevils are wingless, and therefore normally spread from tree to tree by crawling.

Several closely allied species of weevils have occasionally caused somewhat similar damage to the buds and foliage of citrus trees and vines. In cases of severe infestation small citrus trees have been denuded of bark and ripening grapes have been punctured.

#### Control.

Owing to the fact that the adult weevils emerge and cause their main injury so early in the spring, the application of the routine lead arsenate sprays for codling moth control is too late to prevent damage to buds and young leaves.

Some limited tests were carried out recently with white oil-cryolite spray. The cryolite was used at the rate of 1 lb. to 28 gallons and the white oil emulsion at 1 quart to 100 gallons. Feeding ceased soon after spraying, and in twenty-four hours the majority of the beetles were dead.

# A Staphylinid Beetle.

(Pacderus cruenticollis)

DURING the past two months, numbers of growers have brought in this staphylinid or rove beetle for identification. These beetles have occurred in very large numbers under vegetables such as lettuce and melons, under flowers, and in moist situations under hedges. In favourable locations the beetles appear to be more or less gregarious, and are generally to be seen on the ground. When disturbed, the beetles move very actively, and frequently elevate the tip of the abdomen in the fashion of the common earwig.

This particular species of beetle has a wide range over eastern Australia, and also occurs in Tasmania. The beetle is very distinctive, with abbreviated steely-blue wing covers, and with bright-red bands about the prothorax and the centre of the abdomen. It measures slightly less than  $\frac{3}{8}$  inch in length. In the bush the beetle is frequently found under stones and in other such sheltered and moist places, and this probably explains the presence of unusually large

numbers of beetles under growing plants during the hot dry spells experienced

Both the larvae and adults of this group are predators, feeding on other insects, or scavengers of decaying animal or vegetable



Adults of the Staphylinid Beetle. (Enlarged twice.)

matter. In South Australia, a closely allied species has been recorded feeding on the lucerne flea, Sminthurus viridis; other species in various parts of the world have been reported to attack other insects, mainly pests, although in some instances beneficial insects have also been destroyed.

Numerous observations carried out during this season have not given any definite

information of the feeding habits of this particular species. The preference of the beetles for the moister situations would indicate that they are in search of small insects such as springtails normally found in such places. Growers observing beetles sheltering in numbers under various plants may, therefore, be assured that the beetles are predatory, and as they do not attack plants, no injury can result from their presence.

## The Coon Bug.

(Oxycarenus arctatus.)

THE coon bug is a native insect which normally feeds and develops amongst weeds, and does not usually attack cultivated crops. During the present season, however, they have been unusually abundant in inland and coastal parts in New South Wales and have caused injury to various orchard fruits, the damage in some instances being particularly noticeable on plums, apricots, peaches and



Coon Bug.
(Oxycarenus arctatus.)

figs. The bugs cluster mainly on the fruits around the stalks, or beneath leaves which are in contact with the fruit. Where figs are infested the leaves become curled, and the bugs cluster within. Various cultivated garden plants were also attacked.

It is thought that the lack of green herbage, due to the unusually dry season, may largely have been responsible for the bugs infesting cultivated plants.

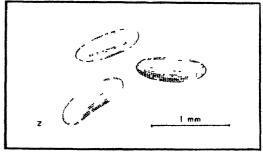
The adult bug measures about 1/8 inch in length, and is marked with black and white. The immature forms are blood-red marked with black.

The eggs are narrow, elongate, with rounded ends and measure slightly less than one-twenty-fifth of an inch in length. When first deposited they are whitish, translucent, opalescent and shiny, with indistinct, longi-

tudinal striations. As the young bugs develop within them, the eggs take on a reddish-orange colouration. Eggs were deposited in the field during the middle of November, on marshmallows (Malva sp.) mainly, under the sepals enclosing the fruit, but also on the leaves.

#### Control.

Dusting the infested trees or plants with a mixture of equal parts of pyrethrum powder, and 2½ per cent. nicotine dust has given good results. These two dusts should not be mixed together until just before use.

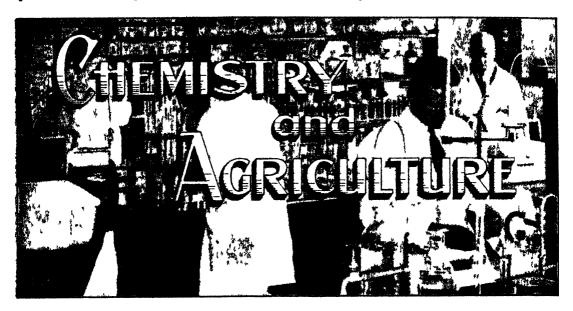


Eggs of Coon Bug.

A dust containing one part of pyrethrum powder and two parts of talc may also be used.

A kerosene emulsion incorporating pyrethrum extract may be used as a spray. The making of this spray is described on page 38 in connection with crusader bug.

Don't Let Rumours or Secrets Get any Further than You.



# The Geologic Sources Of the Commoner Chemical Elements.

# Their Agricultural Significance.

(Continued from page 606)

A N OLD, B Sc Agr, Analyst

#### SODIUM.

Sopium is the most abundant of the group of elements known as the alkali metals the other members being potassium, lithium caesium and rubidium. This group is not to be confused with that of the alkaline earth metals, calcium, barium, strontium, radium. Sodium is the sixth most abundant of all the elements and fourth of the metallic elements. Potassium follows it closely, but the other three members of the group are comparatively rare.

Sodium compounds have been known since antiquity, but the free element does not occur in nature and was isolated only in 1807, by Humphrev Davy

#### Sodium in Silicate Minerals.

The principal original sources of sodium are the many rock-forming silicate minerals

which contain it Albite (Na<sub>2</sub>O Al<sub>2</sub>O<sub>3</sub> 6SiO<sub>2</sub>) is the typical soda feldspai. There are also a number of soda-lime feldspais such as oligoclase andesine labradorite and bytownite which form a continuous gradation from albite to the lime feldspar anorthite Labradorite is strikingly developed as large lustrous semi-transparent crystals in a building stone (gabbio) imported from Sweden and used to some extent in Sydney buildings. As well as the soda bearing feldspars other silicate minerals rich in soda are nepheline, sodalite, hauyne, aegirine and jadeite Jadeite is one of two minerals known as jade A further group of silicates, the zeolites many members of which contain sodium (for example stilbite analcime and natrolite) occur usually as second ary minerals filling cavities and fissures in igneous rocks, they have resulted from the alteration of fldspars, etc. Analysme does

sometimes occur as a primary mineral and as such is well developed in the dolerite at Prospect, New South Wales.

#### Acid, Basic and Alkaline Rocks.

It is opportune to point out here that the terms acid, basic, and alkaline are used in geology in a somewhat different sense than in chemistry; unless this is understood, much confusion is inevitable. In rock classification an acid rock is one which contains more than about 65 per cent. of silica, a basic rock ore containing less than about 52 per cent. silica, and an intermediate rock from 52 to 65 per cent. Sometimes the terms persilicic, sub-silicic and medio-silicic are used instead. The common bases are aluminium, iron, magnesium calcium, potassium and sodium. Where the alkali metals potassium and sodium are present in comparatively large amounts compared with the other bases, the rock is described as alkaline. According to the amount of silica present there can be acid-alkaline, basic-alkaline or intermediate alkaline rocks. That a rock can be both acid and alkaline will appear anomalous to anyone acquainted with the usage of these terms as applied to soil reaction, etc., unless it is realised that the geological usage is quite different and has no direct relation to pH value.

In comparatively late geologic time, several centres of volcanic activity developed in New South Wales, and an interesting series of alkaline rocks rich in soda-feldspar, aegirine, nepheline and sodalite were erupted or intruded. Lavas and tuffs built up volcanic cones as at the Canoblas Mountains near Orange, the Warrumbungle Mountains near Coonabarabran and the Nandewar Mountains near Inverell. Two large intrusions of alkaline rock well known in the Mittagong-Bowral district are the Gib and Mt. Jellore. Alkaline rocks also occur at Kiama, Dubbo, Lue, in the Northern rivers district, at Mt. Kosciusko and elsewhere. Some of these rocks contain as much as II per cent. of soda (Na<sub>2</sub>O). The syenite from the Gib at Bowral contains 5.65 per cent. of soda (Na<sub>2</sub>O<sub>2</sub>) and 6.97 per cent of potash (K<sub>2</sub>O) the soda being present chiefly as a constituent of the mineral aegirine.

#### The Obsolete Soil-zeolite Theory.

The group of silicates known as zeolites, mentioned above, usually occur as beautifully

formed crystals. They are extremely unstable and weather readily. Zeolites always contain combined water—they fuse easily, swelling and losing water, hence the name "zeolite" from the Greek word meaning "to boil." Freed of water, they have a remarkable absorptive power, readily taking up water and diverse compounds. This property bears some resemblance to the absorptive powers of soils, and led to the "soilzeolite hypothesis" which has since been abandoned, the absorptive power of soils having been shown to be connected with its colloidal properties.

#### Sodium in Non-silicate Minerals.

In addition to the silicate minerals already referred to, sodium is a constituent of a number of other important minerals. Halite or rock-salt consists of the chloride (NaCl). It occurs in beds associated with other salts as at Stassfurt, Germany, and in France, Austria, Poland, United States of America, and elsewhere. These deposits have resulted from the evaporation of enclosed bodies of sea or lake water. Salt is present almost universally in soil, sediments and waters, in particular in the ocean and in salt lakes such as the Dead Sea, Great Salt Lake of Utah, and many lakes in Central Australia.

Nitratine or sodium nitrate ("caliche") occurs chiefly in Chile and is used as a fertilizer. Sodium carbonates, borates, and sulphates occur as well as sodium chloride, as a result of evaporation of lakes in arid regions—Wyoming, Nevada and California are important localities. Cryolite occurring in West Greenland is a fluoride of sodium and aluminium (3NaF.AlF<sub>1</sub>).

#### Sodium in Living Organisms.

Sodium is not generally considered an essential element for plants, although it occurs widely, being usually uniformly distributed throughout the whole organism. Potash salts, on the other hand, tend to be confined to particular organs. Soils have a strong absorbing and retaining power for potassium, as compared with sodium, a fortunate property from an agricultural viewpoint, because of the importance of potash as a major nutrient element. Both marine and land plants preferentially absorb potash salts.

Plants which contain an exceptionally large amount of sodium chloride are the saltbushes of inland Australia. The Queensland saltbush has been used in crop rotations in the Sudan for the removal of salts introduced by irrigation water. One crop was found to remove about 1,600 lb. of salt per acre.

In the case of animals, sodium is considered an essential element. Most parts of animal bodies and animal fluids contain sodium chloride.

#### Salinity of Soils and Waters.

The term "alkali," in addition to the usages already mentioned, is also used in reference to any accumulation of soluble salts which render the soil solution sufficiently concentrated to injure plants. Such salts are the chlorides, sulphates, carbonates and nitrates of sodium, potassium and magnesium and the chloride and nitrate of calcium (calcium sulphate and calcium carbonate are not sufficiently soluble to be injurious). Sodium chloride and sodium carbonate are the salts most commonly concerned. The carbonate is particluarly harmful.

Soils containing injurious amounts of salts are found in every continent, important factors in their occurrence being firstly. aridity, and secondly, the nature of the rock from which the soil is derived. Under irrigation conditions particularly, alkali presents a serious problem.

Another aspect of the distribution of sodium compounds of immense practical importance is their occurrence in natural waters—the salt content of river, creek, spring, bore and well waters, is of direct concern both for irrigation and for stock purposes. This is particularly so in Australia, where so much reliance is placed on artesian bores and ground water.

#### Commercial Uses.

Metallic sodium is used largely in organic syntheses. Radio-sodium a radioactive isotope is used in medical research. Sodium chloride, in addition to its use as common salt, rock salt, etc., has a number of industrial applications, as in freezing mixtures. Commercial sodium carbonate known as soda ash (99 per cent. Nc,CO3) is used in very large amounts in the manufacture of soap, paper, chemicals, paints. enamelware, etc. Ordinary washing soda is sodium carbonate, while baking soda is sodium bicarbonate. Soda-water, however, contains carbon dioxide (CO<sub>2</sub>) but no soda. Sodium nitrate, in addition to its use as a nitrogenous fertilizer, has many industrial applications—as in metallurgy, and the manufacture of explosives. Sodium fluosilicate, a by-product of superphosphate manufacture, is used as an insecticide. Hundreds of other compounds of lesser importance, both organic and inorganic, are known.

Australia does not possess deposits of salts corresponding to the immense deposits of other parts of the world. Large amounts are obtained, however, from salt lakes and from sea water.

(To be continued.)

## Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recom-mended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:--

Tomatocs-

Australian Earliana, Bonny Best, Break-o'-Day, Improved Walker's Recruit, Red Marhio, Salad's Special.

Cauliflowers-

Hawkesbury Solid White, Nugget, Shorts.

Hunter River Brown, Maitland White.

Pumpkins-

Queensland Blue.

Beans-

Tweed Wonder, Brown Reauty.

Fitzroy, Learning, Giant White, Golden Superb, Hickory King, Funk's Yellow Dent, Wellin-grove, Golden Glow, Golden Nugget, Large Goldmine, Murrumbidgee White, Large Red Hogan.

Sorghum-

White African, Saccaline, Jones.

Grain Sorghum-

Kalo, Hegari, Wheatland Milo, Texas Blackhull Kaffir, Feterita

Japanese Millet-

Sweet Corn

Golden Bantam.

Vclvet Beans-

Broom Millet-

Grasses, etc.-

Phalaris tuberosa, Subterranean Clover (mid-season), Sudan Grass, Lucerne.

# Approved Seed.

# January, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied regarding it to inquirers.

Tweed Wonder-Rumseys Seeds Pty. Ltd., 210 Church-street, Parramatta.

Beetroot.

Early Wonder-A. Yates & Co., 184 Sussexstreet, Sydney.

Detroit Dark Red-A. Yates & Co., 184 Sussex street, Sydney.

Early Wonder-Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta.

Broom Millet.

Manager, Experiment Farm, Bathurst.

Cabbaac. Succession-A. Yates & Co, 184 Sussex-street, Sydney.

Yates' Select Succession--A. Yates & Co., 184-186 Sussex-street, Sydney.

Cauliflower.

Shorts--H. G. Crew, Nullenroo, Gresford. B. Bradle: Sherwood Farm, Moorland. Superior "K" (Selected Snowball)—Rumseys

Seeds Pty. Ltd., 219 Church-street, Parra-

Hawkesbury Solid White-Rumseys Seeds Pty. Ltd., 210 Church-street, Parramatta. E. A. Sharp, 110 Gordon-avenue, Hamilton.

Phenomenal Maincrop-A. Yates & Co., 184 Sussex-street, Sydney.

Phenomenal Five Months-A. Yates & Co.,

184 Sussex-street, Sydney.
E. A Sharp, 110 Gordon-avenue, Hamilton.
Yates' Phenomenal Early—A. Yates & Co.,

184-186 Sussex-street, Sydney.

Cucumber.

Richmond Green Apple-Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta. Early Fortune—Rumseys Seeds Pty. Ltd., 219

Church-street, Parramatta.

Imperial 847-Runseys Seeds Pty. Ltd., 219 Church-street, Parramatta. Imperial 847-A. Yates & Co., 184-186 Sussex-

street, Sydney.

Parsnip. Hollow Crown-A. Yates & Co., 184-186 Sussex-street, Sydney.

Queensland Blue Large Type--Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta.

Rhubarb.

Sydney Winter-Rumseys Seeds Pty Ltd., 219 Church-street, Parramatta.

Sorghum.

White African-Manager, Experiment Farm, Grafton.

Saccaline-Principal, II.A. College, Richmond. Jones - Manager, Experiment Farm, Wollong-

Sweet Corn.

Golden Bantam -Principal, 14.A. College, Richmond.

Tomatoes.

Best-Manager. Experiment Farm. Ronny Bathurst (4s. oz. posted). Potentate—A. Yates & Co., 184 Sussex-street,

Sydney.

Improved Walker's Recruit-A. Yates & Co.,

184 Sussex-street, Sydney. Potentate—Rumseys Seeds Ptv. Ltd., 219

Church-street, Parramatta. Marvana—Rumseys Seeds Pty. Ltd.,

Church-street, Parramatta. Break-o'-Day-Rumseys Sceds Pty. Ltd., 219

Church-street, Parramatta.

Australian Earliana-Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta.

Rouge de Marmande—Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta. Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta.

San Marzana Thick Type—Rumseys Seeds Pty. Ltd., 210 Church-street, Parramatta.

Vegetable Marrow.

Long White Bush-Rumseys Seeds Pty. Ltd., 219 Church-street, Parramatta.

Velvet Beans.

Manager, Experiment Farm, Grafton.

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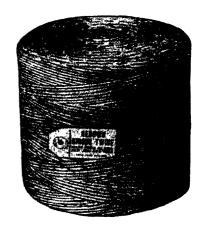
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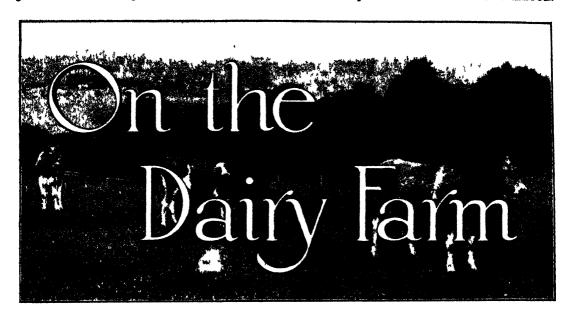
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# Cattle Tick Facts Told by Stockowners

Who have been through an Eradication Campaign.

AN eighteen months' fortnightly dipping campaign commences in the Grafton-Maclean area this month. Some opposition has been raised on the score that a lengthy period of regular dipping is likely to do harm to stock and production. Such fears are based mainly on surmise, or on a very few isolated "accidents" which it is next to impossible to guard against in large-scale operations such as tick eradication campaigns, in which thousands of animals are handled at frequent intervals over an extended period.

A wealth of evidence, taken from actual experience, has already been quoted to prove the harmlessness of the measures employed and the immense benefits to be gained. In this regard the tollowing experiences of stockowners (dairy farmers and beef cattle men) who have been through dipping campaigns are convincing.

#### Dipped Fortnightly for Twenty-two Months.

A Casino farmer controlling three dairying properties and also raising fat stock, writes:—

"In September, 1937, an outbreak of tick fever occurred on one of my fattening holdings, which at the time was grazing 150 head of bullocks. These bullocks were dipped every fourteen days for twelve months. At the expiration of this dipping period the eradication campaign commenced, which entailed the dipping of all stock for a further ten months at fortnightly intervals.

"During the latter campaign I was constantly selling bullocks from this property to the meatworks, and in my opinion the dipping in no way interfered with the fattening of the bullocks. During the whole twenty-two months of dipping I fattened and sold 456 head of bullocks off this one property.

"It is my personal opinion that ticks on stock interfere with the production and condition more so than the dipping."

This man has dipped regularly and voluntarily for twenty-five years, and says very definitely that it neither harms the stock nor adversely affects production.

#### Thrived on Dipping.

"The young stock ended up in perfect condition and I did not have any losses," writes a Lynch's Creek darry farmer who went through the Kyogle eradication campaign "I have had twenty-three years' experience in the Kyogle district," he continues, "and have found that dipping is much more effective than spraying"

This farmer concludes by expressing "perfect satisfaction" with the way in which his stock were handled by the Tick Board Staff.

#### No Losses Whatever.

A Cangai farmer whose stock went through the Copmanhurst eradication campaign is very emphatic.

"I treated between 500 and 600 head of dry and dairy cattle, and there were no deaths," he writes. "I can assure you the cattle did just as well as before treatment. As for the dairy cattle, there was no noticeable decline in production whatever. I might mention that the best poddy calves I ever reared went through the dipping."

#### Dipping Prevents Losses.

"I am quite sure," writes a Kyogle stockowner, "that had we not gone through with the dipping campaign the losses in this district from tick fever would have been very considerable"

#### TENANTS AND SHAREFARMERS.

#### Acquaint Yourselves with New Act.

THE Agricultural Holdings Act, 1941, will shortly be proclaimed. This new Act is designed to effect a vast improvement in the present unsatisfactory landlord-tenant or sharefarmer position. It provides for a two-years' minimum tenancy and safeguards the interests of the parties in regard to improvements effected, etc.

Tenants, sharefarmers and landlords are urged to familiarise themselves with the provisions of the Act. Unless the Act is used by those whom it is intended to benefit, then little benefit will accrue either to individuals, the industry or the State.

Copies of the Act are available from the Government Printer, Phillip-street, Sydney; price, 1s. It is intended shortly to publish an explanation of the various fromsions of the Act in non-legal terms. In the mean time, the field officers of the Department are only too willing to discuss any aspect of the Agricultural Holdings Act with farmers.

This man admits that it is a somewhat natural conclusion to come to by those who have had no experience of regular dipping that considerable losses will result, "but," he writes, "I can say without hesitation that the conclusion is a wrong one. If cattle become infested, even with good feed available, the milk yields deteriorate, and run cattle will fall away quickly in condition After going through the eradication treatment, I can say the losses were practically nil and there was no appreciable difference in revenue from either dairying or grazing."

#### Favours Longer Campaign.

"After the experience of previous years," writes another Kyogle dairy farmer, "I, like many others in this locality, are very happy to have had our stock cleaned up, but we now think it a pity that we did not have a few more months of the campaign to clear the ticks right out. It was yery

pleasing to me to see the cows coming into the yard week in and week out without a tick to be seen on them. . . . As to the milking cows, we commenced with about fifty and got up to over seventy as the season went on. They were dipped within twenty minutes of being milked, and except during some very hot and dry weather there was no noticeable difference in the milk flow."

#### No Trouble with Draught Horses.

"I would not tolerate the spraying of either horses or cattle, provided a dip is handy and no excessive travelling is called for," states a Findan Creek (Kyogle) farmer. "All my working draughts were dipped throughout the eradication campaign, and not the slightest trouble was experienced. Of course, I allowed my horses to spell on dipping day, but would point out that they were worked constantly throughout the year with the exception of the day mentioned.

"I have been a constant dipper of all my stock (including dairy cattle) for the past thirty years, and in addition I have undergone an eradication campaign. I have found that dipping has no adverse effect on cattle, and even during the fortinghtly dipping campaign no decline in production was noted, except that which was directly due to seasonal conditions."

#### Experience Versus Surmise.

The foregoing extracts are taken from letters directed to the Department of Agriculture by stockowners who have been through eradication campaigns and whose experiences prove that the much publicised objections to regular dipping are based on surmise or on eroundless fears existing in the minds of owners (or their spokesmen) who have never dipped their stock.

#### Care of Butter Room Woodwork.

1. W. SCOTT, Senior Dairy Instructor.

With the advent of stainless steel and its general adoption by the dairy industry for use in factories, a marked improvement has taken place in the sanitation of such equipment as neutralising vats, cooler trays, cream vats, pipes, etc. In only a few instances, however, has this improvement been extended to the butter room equipment.

Wooden churns which are located in the butter room can be satisfactorily cleansed and maintained in a sanitary condition because they may be treated with a large volume of very hot water. This does not apply, however, to the rest of the butter room equipment, such as butter barrows, trolleys, rammers, packing machines, rollers, pats, etc.

It has been found that the unsatisfactory condition of these appliances is now one of the largest contributing factors to contamination of butter. Too frequently these items are "cleansed" by hosing and a rather perfunctory wash with a bucket of water, plus soap and soda, resulting invariably in a greasy, fat-saturated surface. This fat saturation has been traced in to a depth of over \$\epsilon\$ inch, and as each lot of butter is handled, thousands of undesirable organisms are added to

the butter-particularly in the summer when high atmospheric temperatures cause the fat to "ooze" -with the result that otherwise sound butter may develop, in particular, a high acid and stale flavour or a decomposed aroma.

With proper attention this wooden equipment can be kept in a satisfactory condition, though a lot of trouble is entailed, and as far as barrows and trolleys are concerned, the risk of contamination can be eliminated by covering the surface of trolleys with stainless steel and fitting a stainless steel liner to barrows. Stainless steel has been in use on trays in New Zealand for many years, while trolleys so fitted have been in use in some New South Walcs factories for a considerable time with very satisfactory results. It was thought that stainless steel would prove too sticky in use, but this has not been borne out in practice. The stainless steel lining for barrows or trolleys should be fitted so that it can be readily removed for cleaning between the lining and the body of the barrow or trolley.

#### Cleansing of Wooden Butter Room Equipment.

The development of a greasy, fat-saturated surface on the butter room woodwork other than the churns, can be prevented by using the following method:---

1.—After each churning and while waiting for the next one, hose off the butter left on the woodwork with water not above 120 degrees Fahr., thus preventing melting of the fat and soaking into the wood under unsuitable atmospheric tem-

2.—At the end of each day, hose the butter off. then scrub with hot water containing a neutral soda at the rate of 2 lb. per 100 gallons, or 1 lb. soda ash per 100 gallons. Then rinse and scald with water at least 200 degrees Fahr.

3.—Once a week, paste all woodwork with a cleansing compound, leaving this on overnight and

scrubbing it off in the morning.

Some butter trays supplied with the modern short barrel churns can be, occasionally, filled with water which is boiled, it only being necessary to nail pieces of board over the outlet drains to retain the water.

There are many compounds and methods of cleaning butter room equipment, but whatever method is adopted the essentials are:-

1.--Hosing or washing off of all fat with water not over 120 degrees Fahr.

2. -Scrubbing with hot alkali.

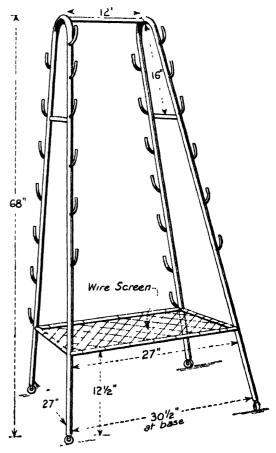
3.—Scalding with clean water 200 degrees or over. Small items such as pats, etc., should be treated in a vat.

After sterilising, pats, rammers, rollers and small items should be placed so that the maximum surface is exposed to the air, which will result in rapid drying. It is a mistake to throw them in the barrow in a jumbled heap as is so often

#### A Rack for Drying Wooden Equipment.

This mixture of pipes, strainers, butter spades, pats, rammers, surface rollers, etc., results in wet patches on the sides of wooden equipment where air does not reach, and not infrequently, these wet patches when examined before use next morning are found to be sour smelling and contaminated.

With a view to avoiding this trouble, one factory (the Upper Wallamba River Co-operative Dairy Society Ltd.) has installed the rack illustrated with very satisfactory results. Every portion of the wooden surface of the utensils is exposed to air and can dry rapidly after use.



A Useful Type of Drying Rack.

#### Washing of Churns.

While the care and washing of churns is much more efficiently carried out than is that of the rest of the wooden equipment, there is still room for improvement in many cases. Churn contamination is still a potent cause of sporadic outbreaks of inferior quality butter. The following method of churn treatment is recommended as one that has proved itself, and if followed will result in long and satisfactory service from the churn: -

1.—Before commencing churning in the morning, rinse the churn with 50 gallons of boiling water, revolving at least 5 minutes. Chill thoroughly before use, and if considered necessary use a chemical disinfectant in the chilling water.

2.—After completion of the day's churning hose all remnants from the churn with water not over 120 degrees Fahr.

3.—Run in 50 gallons of water at 200 degrees or over, and add I lb. neutral soda, or a 1/2 lb. soda ash. Revolve 5 to 10 minutes and drain.

4.—Fill the churn one-quarter to one-third full of plain water, and see that it is 200 degrees or over before whirling the churn for 15 to 20 minutes. Use a thermometer to check the tem-perature. Drain, leaving the door on the top side.

Step three is designed to remove the fat remaining, while step four is designed to sterilise the churn. Often the soda is added to the big volume of water and in too great a quantity, with the result that a film of soda is left on the woodwork; this in the long run is deleterious to the woodwork and life of the churn and is also con-ducive to "stone" formation, particularly where hard water is used.

The efficient supply of large quantities of very hot water is required for washing up in the butter room, and whatever the method in use, a steam hose should be provided at the churn to boost the temperature as required and a thermometer should be used to see the water is the correct temperature before whirling. Even the best hot water services have been found to be insufficient, at times, to provide water over 200 degrees, as temperatures drop rapidly while the water is running into the churn.

# World's Oldest Cow She Was Twenty-nine Years Old.

THIRTY years ago a cow of the Ayrshire breed was exported to Australia from Scotland. She had a calf named "Victoria," and this animal has just died at the age of twenty-nine years, the greatest age ever recorded for a milking cow.

At eighteen years of age, when she was bought by Messrs. Korff Bros., of Campbelltown, near Sydney, she produced 15,505 lb. of milk and 473.35 lb. fat. Two years later she was champion at the Sydney Royal Show, and even at the age of twenty-four, when she won second prize,

age of twenty-four, when she won second prize, she gave 13,313 lb. of milk and 542 lb. fat.

"Victoria's" only son, "Glengowan Victor," born when she was twenty years old, has sired some of the greatest milk producers in Australia, while a daughter of hers, "Glengowan Joyce," held the Australian record as a two-year-old, and produced 53,433 lb milk and 2,296.9 lb. fat in four lactations each of 273 days

tions each of 273 days.

## Pleuro-Pneumonia.

#### Sometimes Confused With Digestive Troubles.

FURTHER outbreaks of pleuro-pneumonia have been reported from Maitland. The District Veterinary Officer in that area points out that outbreaks of the disease in beef cattle are usually reported early, but that it is often well established in dairy herds before notice is given. This is difficult to understand, seeing that dairy cattle are under much closer observation than beef cattle.

One explanation appears to be that the dairy farmer confuses the onset of pleuro-pneumonia with digestive troubles. The cows are often highly fed and are thought to be suffering as a result, The Department has knowledge of the same mistake being made in other districts in past years.

If there is any doubt whatever, stockowners are urged to seek veterinary advice, particularly if pleuro-pneumonia is known to be present in the district.

#### PRUNES AT YENDA—continued from page 28.

In the second place, cultivation soon after irrigation, when the soil is moist, is damaging to soil permeability.

However, a policy of no-cultivation is not implied or advocated. Although it ought to be considered no longer a sound practice to cultivate for the conservation of soil moisture, cultivation is beneficial in other directions, the effects being very incompletely understood. The native cover crop presents an ideal system of minimising cultivation.

With regard to the "cover" aspect of this system of soil management, burr clover, the predominant native species in the cover crop, grows from March to November, when lower evaporation conditions prevail. During this time it affords a protective cover to the soil, and in the later part of the period yields a heavy protective mulch of dead leaves, stems and burrs (containing the live seeds), beneath the cover. Thus for the greater part of the year, the soil is undisturbed to ploughdepth; it is under a superimposed mulch and holds moisture, and it is permeated and utilised

by the tree roots.

When the cover is mature it is disced-in. The cut of the disc should not be any deeper than

will just incorporate the trash in the soil, thus leaving as much of the trefoil roots undisturbed as possible. In cultivated orchards the soil con-

ditions within plough-depth are quite different.

Burt clover has an extensive and ramifying system of fine roots. As a result of the death, in situ, of this root system, the soil becomes observably more penetrable by water and the fine feeding roots of the trees. Only water in the immediate vicinity of the roots is available to them, and pockets or patches of soil may occur in the root zone which cannot yield their water to the trees because they are not penetrated by roots. It seems that the ramifying roots of the native clover render the whole soil mass more penetrable, and thus increase the tree's moisture and nutrient supply. It is possibly because of this better permeation of the full rooting zone by moisture, air and tree roots, that orchards, after being under clover cover crop, show less stress at the end and less lag at the beginning of an irrigation interval. Whereas formerly, deep, tap-rooted plants were favoured for "opening-up the soil, it now appears that fine and extensively rooted plants may be much more valuable, especially for heavy and highly-structured soils.

# Brucellosis-free Herd Scheme (Swine).

## List of Accredited Herds.

The following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Allard, S. R., Cleobury Stud, Werombie Road, via Camden. Bathurst Experiment Farm, Bathurst. Burd, Norman, Nalisworth Farm, Wallacia. Boardman, C. O., "Fairview," Camden.
Campbell, D., "Hillangrove," Wamberal, via Gosford. Cartwright, W. J., Barooah Stud, Boundary Villa, Temora. Chapman, G. E. and Son, "Illabo Park," Alectown. Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Croft, F.. Lugwardine, Kentucky.
Crooks, A. V., Carara Stud, Mimosa, via Temora.
Draper, R. B., "Glengar," Capertee.
Bade, E. M., "Bade Vale," Buchareena.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Garrard and Price, Boorie Stud, Nimbin Road, Lismore.
Genge, J. I., "Springfield," Rugowra.
Grafton Experiment Farm, Grafton.
Grafton Experiment Farm, Grafton.
Grafton, E. H. Kinilabah Stud, Wagga.

Harris, K. H., Pennant Stud Piggery, Purchase Road, West Pennant Hills.

Hawkesbury Agricultural College, Richmond.
Hennessey, J., Pacific Stud Piggery, Holgate.
Holland, A. L., Argonno, Tubb.il.
Hollow, R. D., Canlea, Canadian Lead.
Maybin, N. C., Towac, Orange.
Macarthur (John) Memorial Agricultural High School, Glenfield.
McCaughey Memorial Agricultural High School, Yanco.
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F., "Camelot," Penrith.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud." Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell.
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla
Emu Plains Prison Farm, Rmu Plains.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.
Masters and Upston, Whitmore Stud Farm, Wamberal, via
Gosford.

Morisset Mental Hospital, Morisset.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Parramatta Mental Hospital, Parramatta.
Paterson, R. R., "Nostrebor," Matcham.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pike Bros., Wamberal, via Gosford.
Punnett, R. S., Brawlin.
Smith, C. W. J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

# Katahdin Potato Increases in Popularity.

THE Katahdin potato, an American introduction, was released by this Department to growers in 1933, and since then the acreage planted to the variety has rapidly increased each year. It is now firmly established in most potato districts in New South Wales, writes Mr. A. C. Orman, Senior Agricultural Instructor.

During the last three years Katahdin has been used extensively on the coast, where it has proved to be very suitable, particularly for early planting. In the Gosford district, Katahdin has given excellent results on the light sandy soils, and it is the principal variety now grown in this locality. Factor was the chief variety grown for a number of years, but is being rapidly replaced by Katahdin.

The Windsor district is not ideal for early potatoes, particularly the late varieties, because maturity usually corresponds with high summer temperatures and, in addition, moth damage is unusually heavy in most years. Being earlier than Factor, Katahdin is more suitable for such

districts. On the lower Hunter also it is thought that Katahdin will prove a useful variety, especially now that many growers have installed irrigation plants. Some growers in this district have indicated their intention of growing the variety next season.

For a number of years growers in the Miranda district have used Arran Chief for early planting. Although this variety has given satisfactory results it is likely, following the tests carried out in this district by the Department, that Katahdin will be planted more extensively next season.

Katahdin matures approximately two weeks earlier than Factor. It produces short, oblong to roundish tubers with comparatively few shallow eyes. The skin of the tubers is very smooth and white in colour and for this reason they lend themselves to washing for marketing in small packets. A feature of the variety is the large percentage of commercial tubers produced which is important in that grading costs are reduced.

# Oil Meals as Stock Food.

#### (Continued from page 22.)

grain when the cost of starch equivalent is compared, and cheaper than the grains when the cost of protein equivalent is compared.

The oil meals in general suffer from certain disadvantages when compared with grain for some types of feeding—in particular, for drought feeding of sheep. Grains may be conveniently spread on the ground, but meals must be fed in troughs or self-feeders mixed with other feeds, as chaff, salt, or molasses. If oil meals are incorporated in proprietary nuts or cakes, their feeding is considerably facilitated. In pig, poultry and cattle rations, the meals are easily fed as cake or mixed in with the rest of the ration.

A consideration of the feeding of each animal with these meals is of value.

#### Sheep.

The meals lend themselves well for mixing in with other feeds for the preparation of a compound sheep feed, mixtures with bran, pollard, maize, oats, wheat, molasses, meat meal and salt, being used.

Linseed meal is the best known of the meals for sheep-feeding purposes, being usually fed in cake or nut form in amounts from I to 6 oz., and is reported as especially valuable for in-lamb and milking ewes and sheep on old dry grass low in protein; however, for dry ewes and wethers, maize is reported to be just as valuable for maintenance purposes when hay is also being fed.

From stock inspectors' reports it would seem that feeding of the other oil meals is not as widely practised as a comparison in prices would seem to justify. Thus, a big increase in the use of peanut, copra, and cottonseed meals would be compatible with good feeding economics. Peanut meal would seem to be especially indicated, owing to its palatability and cost. Copra itself, which contains about 60-70 per cent. fat and 5-7 per cent. crude protein, has been used as a sheep feed, but its use is not recommended at present. Copra meal, however, would prove an excellent feed.

#### Cattle.

Linseed meal is again the most widely used of the meals, being fed up to 4 lb per head, and is recognised as an excellent milk producer. If fed in large amounts, a high fat content meal may produce a soft butter, This has also been reported to occur with peanut meal. Cottonseed and copra meals have an opposite effect, i.e., tend to produce a firm butter. When the full value of these other meals is realised a great increase in their use as cattle feeds can be expected. As with linseed meal, up to 4 lb. may be used.

The meals are of great value for the preparation of calf gruels and meals, starting with ½-1 oz. when a commencement is made with the feeding of skim milk and working up to ½-1 lb.

The present shortage of bran and pollard should sharply focus the attention of dairymen on these meals.

#### Pigs.

Owing to their high protein content, it is generally not economic to feed these meals to pigs. Where a cheaper source of protein, as separated milk or butter-milk, is not available, the meals can replace up to 50 per cent. of the meat meal which is often then fed under these circumstances. A famous American protein concentrate comprises 50 per cent. meat meal, 25 per cent. linseed meal, and 25 per cent. lucerne chaff for pigs not on pasture, and 50 per cent. meat meal and 50 per cent. linseed meal for pigs on pasture.

Peanut meal is recommended in amounts up to 5 oz. for fattening pigs and 12 oz. for brood sows, but cottonseed meal must be fed with caution, owing to the presence in the meal of a poisonous fraction, gossypol, which has occasionally caused deaths. However, up to 10 per cent. of a ration may be safely fed as cottonseed meal. Copra nieal is recommended in amounts of ½-2 lb., depending on size and age, and very good results are reported.

Where oils are substituted for meat meal, calcium supplements should be increased to make up for the deficiency of these meals in this element. Exceptionally cheap oil meals may even economically replace a proportion of the grain, up to 25 per cent, substitution of barley being successfully used. Copra itself has been used as pig feed in other countries, but its use will not be recommended here until experiments have been conducted to prove its value.

#### Oil Meals for Poultry.

The oil meals may be used in standard poultry rations to replace up to 10 per cent. of the bran of the ration, leaving the meat meal percentage intact owing to the low value of the oil meal proteins when compared to those of meat meal. Cotton-seed meal is not recommended, however, owing to a tendency which has been noted at times to produce discoloured yolks on storage of the eggs. As low a fat content as possible in the meals fed is aimed at, as trouble has been experienced with those of high fat.

As with cattle, the shortage of wheat byproducts should greatly increase the consumption, for where wheat is fed instead of bran and pollard, the oil meals help to balance the ration, as wheat is lower in protein than either of the above.

#### May be Fed to Horses.

All the meals may be fed to horses in amounts up to 1½ lb., being of special value for horses low in condition with poor coats or horses being prepared for shows, the meal being used to replace some of the oats.

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Hawkesbury Agricultural College, Department of Agriculture,
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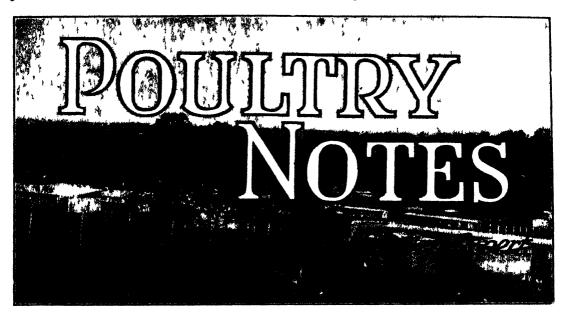
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#### THE FUTURE OUTLOOK.

#### Meeting the Mill Offal Shortage.

THE position created by the extension of the war to the Pacific is causing considerable concern to those engaged in the poultry industry, and undoubtedly much dislocation is likely to occur. However, anything in the nature of a panic should be avoided and the best course is to carry on operations with certain modifications which might from time to time become necessary.

Difficulties are almost certain to arise in respect of disposal of the surplus egg production necessitating changes in present arrangements and the position with regard to the production of mill offals will doubtless become more acute, but as far as food-stuffs generally are concerned we are in a much better position in this country than poultry farmers in Britain, and while costs might increase owing to the necessity of using substitutes, supplies should be available

#### To Overcome Labour Shortage.

In the circumstances, it would appear that for the present the best procedure to adopt would be to cull the hens somewhat more heavily than usual, without depleting flocks below what is necessary to meet the more acute position which is sure to be created by shortage of labour

In making preparations for the next breeding season, the aim should be to hatch just sufficient chickens to cover replacement of hens without attempting to increase flocks. As far as the raising of table birds is concerned, there might be a disposition to concentrate more on this side of the business, particularly in view of the higher prices ruling this season, but here again export arrangements will have in important bearing upon the demand, and the extent to which cockerels night be raised for market will require to be regulated according to the position which exists later in the year

#### Feeding Wheat Meal.

In the event of supplies of pollard and bran becoming more difficult to obtain, the addition of wheat meal to the mash portion of the ration will probably become more widely adopted. In this connection it will be of interest to poultry farmers to learn

that some flour mills are producing a wheat meal from which portion of the flour content has been removed; this product is sold at about 10s. per ton less than ordinary wheat meal. The removal of the flour would improve the meal as a poultry food, and if there were an increased demand for this product it might be possible to prevail upon the milling industry to produce larger supplies at perhaps a still lower cost. meal could be used in the same way as whole wheat meal, as a substitute for any proportion of pollard, and the balance of the mash could be made up with coconut meal and lucerne chaff or meal. By this means the shortage of mill offals could be overcome, although the cost of feed would be somewhat greater.

#### Wheat Meal in the Mash.

Several years ago experiments were carried out at Hawkesbury Agricultural College to ascertain whether the use of wheat meal at the rate of 50 per cent. or 60 per cent. of the mash had any adverse effect on egg production, and a summary of the results obtained will no doubt be of interest to many poultry farmers at the present time. These results can be compared with those of the soaked wheat method of feeding, of which particulars were given in last month's "Poultry Notes."

In the wheat meal feeding experiments, three groups of birds were used, each group consisting of three pens of ten birds. One group was fed on the ordinary ration used at the College, which is as under:—

 Pollard
 60 lb.

 Bran
 34 lb.

 Meat meal
 6 lb.

 Salt
 22 oz.

This was fed as a wet mash, and given in conjunction with the afternoon feed of grain, consisting of 67 per cent. wheat and 33 per cent. maize.

No. 2 group received a wet mas	h of :
Fine wheat meal	50 lb.
Pollard	20 lb.
Bran	22} lb.
Meat meal	7½ lb.
Salt	22 OZ.

The afternoon feed was the same as in Group 1.

Group 3 received:—	
Fine wheat meal	60 lb.
Bran	32 lb.
Meat meal	8 lb.
Salt	22 OZ.

The afternoon feed was also the same as in Group 1.

This experiment extended over three years, but fresh groups of pullets were used each year. The first year's test covered a period of eleven months only, while the second and third were conducted over the complete year.

#### Production Not Adversely Affected.

In the eleven months' test of 1934-35, the birds receiving 50 per cent. wheat meal laid 22.4 eggs per bird more than those fed on 60 per cent. wheat meal, and 12.4 eggs more than those fed on the ordinary ration. The averages of the different groups being:—

Group 1 (ordinary ration), 152 eggs per bird. Group 2 (50 per cent. wheat meal), 164 eggs per bird.

Group 3 (60 per cent. wheat meal), 141.8 eggs per bird.

In 1935-36 the group receiving 60 per cent, wheat meal laid seven eggs per bird more than those fed on 50 per cent, wheat meal, and nine eggs per bird more than the check group. The averages in this case were:—

Ordinary ration, 160 eggs per bird. 50 per cent. wheat meal, 162 eggs per bird. 60 per cent. wheat meal, 169 eggs per bird.

In the final test, during 1936-37, the 60 per cent. wheat meal group again laid the highest number of eggs, the average being 5.5 per hen more than the 50 per cent. wheat meal group, and 9.3 per hen more than those receiving the ordinary ration. The average production per hen was:—

163.3 by those fed on the College ration.157.1 in the group receiving 50 per cent. wheat meal.172.6 in the 60 per cent. wheat meal group.

The results indicate that the use of 50 to 60 per cent. wheat meal in the morning mash does not adversely affect egg production, and although wheat meal is higher in price than pollard and bran, there is at present no other substitute available in sufficient volume to use in place of mill offals, but the production of a meal from which portion of the flour has been removed opens up possibilities of a somewhat cheaper substitute for pollard.

#### Weights of Birds in the Tests.

In order to ascertain if the wheat meal had any effect on the condition of the birds, they were weighed at the beginning and again at the end of the tests in 1935-36 and 1936-37. The average weights were as under:—

	Weight at 1st April, 1935		Weight at 31st March, 1936.		Weight at 1st May, 1936		Weight at 30th April, 1937	
Group r	lb 4	0Z. 3 2	lb.	oz. 6·5	lb.	oz. 3·2	lb 4	0/ 8 5
Group 2	4	5 3	4	8 5	4	4.3	3	15
Group 3	4	4 8	4	77	4	4.2	4	05

The class of wheat meal used in all these experiments was of very finely ground quality, and this, used in conjunction with bran, made a satisfactory mixture.

#### Dried Grass and Ensilage.

Some publicity has recently been given to the use of either dried grass or ensilage as portion of the ration for fowls in Britain and some continental countries, and this has led to inquiries being made as to the suitability of such items for use in this country.

In the first place, it should be pointed out that these supplements are used only to the extent of about 10 per cent. of the morning mash in Britain, and it is stated that the dried grass sometimes causes impaction of the crop, due to the difficulty of cutting it finely before drying.

As far as this country is concerned the facilities and opportunities for drying grasses are limited, especially during dry seasons, when there is a shortage of water. In any case, on the average poultry farm there are few grasses which are suitable for drying.

One of the methods of drying grasses from lawns in England is to place the material on bags to a depth of about I inch. The grass is then turned at least twice daily. In damp weather the grass is spread on the bags and placed in a greenhouse or other suitable building until dry. In sunny weather the grass is placed on bags in the open for a few days and turned once or twice a day until quite crisp and dry. It is then put into open mesh sacking bags hung from the roof of a building to allow the air to circulate through the bags and thus prevent the grass becoming musty.

It is obvious that the drying of grass in England is practised more by backyarders than by commercial poultry farmers, and the grass is obtained mainly from lawns in large gardens.

#### Making Ensilage.

The making of ensilage appears to be a more satisfactory way of utilising any surplus grass cuttings or green feed crops, but unless suitable facilities are provided much waste occurs in the making of ensilage.

For small-scale operations the silage can be made in wooden barrels or straight-sided drums (corrugated sides would not be satis-The material for making the factory). silage should be put through a chaff cutter and pressed fairly tightly into the container, but not too tightly, otherwise the grass will not heat up enough. The material can be added from day to day, and when the container is filled it should be pressed down as hard as possible and a heavily-weighted cover, which just fits inside the drum or barrel, placed on top. It is also advisable to have a waterproof covering to keep out rain. Three to four months is required for the silage to mature, and when ready it can be used at the rate of about 10 per cent. in the mash. The birds might not take to it readily, and it might be necessary to accustom them to it gradually.

The making of silage on a larger scale could either be done in properly constructed silos or in pits, but it is doubtful whether the expense of these methods would be justified on any except very large poultry farms.

#### Grass Silage and Yolk Colour.

The use of grass silage in large proportions is said to cause dark-coloured or olive yolks in eggs. Experiments carried out at Kausas Agricultural Experiment Station. U.S.A., by Gish, Payne, and Peterson showed that young oat grass cut when, or before, the first joints appeared and made into silage caused olive-coloured yolks or "grass eggs" when fed at the rate of 4 lb. per 100 birds. This would indicate that it is inadvisable to feed any large percentage of such silage to laying hens.

#### Be Prepared for Heat Waves.

THE sudden heat wave early this month apparently caught many poultry farmers unawares, and its occurrence on a Sunday, when some employees on most farms were absent, made matters worse. The result was that in quite a number of cases losses were fairly heavy.

This should serve as a reminder that high temperatures can be expected at any time during the rest of the summer, and precautions should be taken accordingly

to avoid heavy losses.

In the first place it must be realised that the prevention of heavy mortality during heat waves depends largely upon proper attention being given to the birds. It is assumed, of course, that housing conditions

are satisfactory.

On abnormally hot days it is advisable to hang a thermometer in a shady position where the correct shade temperature can be ascertained, and when the registration exceeds 100 deg. Fahr. by midday, trouble should be anticipated. The birds, however, do not usually suffer to any extent until the temperature rises above 103 deg., and the worst period of the day is in the afternoon between 1 and 5 o'clock, but in exceptional cases all danger might not be over even then.

Usually, the oldest birds are affected more than the younger ones, and pullets and cockerels seldom succumb to the heat unless deprived of water or are not suitably housed.

#### STICKFAST FLEA REGULATIONS MODIFIED.

The regulations introduced following the occurrence of stickfast flea of poultry in Southern Queensland have become modified to allow dogs and cats to enter New South Wales from certain areas, provided treatment is carried out and required certificates secured.

No flea has vet been found in New South Wales, but inspectors are engaged in searching areas to which there is even a remote possibility that the pest has been taken.

#### Ample Water, Conveniently Placed.

The first consideration is to see that ample water is provided and that it is in a position where the birds do not have to go any distance in the heat to reach it.

Where the houses are of suitable height and reasonably well ventilated, it will be found they are the coolest spots available to the birds, and therefore no attempt should be made to force them out under the shade of trees. Of course, a tree or two which will throw a shade on the houses during the afternoon will help to keep them cool.

#### Attention to Birds.

The best procedure is to make regular rounds of the pens during the hottest part of the day and prevent the birds from crowding into nests or other confined spaces, which they often do in an effort to find a cooler place. They quickly succumb to the heat if allowed to crowd in this way.

Birds affected by the heat can be detected at the onset of prostration by their inability to move about and by heavy respiration. Such birds must be removed from the pen and, after being dipped in water (don't submerge the head, but wet it freely afterwards) should be placed in a shady spot which has been freely watered. If possible choose a spot where there is a Saturation of the birds draught of air. should be avoided except in extreme cases, as they are likely to suffer a chill in the event of a cool change occurring before they dry out.

On exceptionally hot days it might be necessary to resort to wetting the floors of the houses, but where this is done any litter on the floors should be removed before night in order to avoid creating excessive humidity.

In treating birds affected by heat the main factor is to catch them in the early stages of prostration, because when far advanced, recovery is doubtful.

Feeding During Heat Waves.

During a heat wave of several days duration it is advisable to feed the birds sparingly so that they will not develop digestive troubles. In fact, after two or three very hot days it would be preferable to replace the morning mash with a grain feed, consisting mainly of maize if the birds are accustomed to eating such grain.

#### Black Rot of Garden Stocks.

(Continued from page 35.)

#### Additional Measures for Doubtful Seed.

If disease-free seed is sown in clean seed-bed soil, no other measures are necessary, but if healthy seed is not available or if the seed is of doubtful or unknown origin, the following additional measures should be carried out:-

- (a) Seed treatment.—The seed should be treated for four hours in a 10 per cent. bleaching powder (calcium hypochlorite or chlorinated lime) solution, prepared by adding two ounces of bleaching powder to one pint of water in a glass jar. After shaking and allowing to stand for five to ten minutes, the top liquid, which should be almost clear, should be poured off into a second glass jar and the sediment in the first bottle discarded. The seed should then be placed in the solution in the second bottle for four hours, after which it should be removed and spread out to dry before During the treatment the temperaheing sown. ture of the bleaching powder solution should not exceed about 85 deg. Fahr. Owing to the fact that bleaching powder tends to deteriorate with age it should be fairly fresh when used---it would he best to buy a new bottle each year-and the solution should be used as soon as made up. Liquid which has been used for treating one batch of seed should be thrown away.
- (b) Direct sowing in the field.—If practicable, the seed should be sown directly in the field rather than in a seed-bed in order to eliminate most of the plant to plant infection occurring in the seedling stage. This direct field sowing is dependent on a sufficient supply of water, land reasonably free from weed seed and ample seed. since it would be necessary to plant at least three or four seeds in each spot in which it is desired to grow a stock plant. The removal of the weakest plants in the subsequent thinning operations should result in a fairly high percentage of doubles (probably about 80 per cent, for a good strain of seed) since "single" seedlings are usually somewhat weaker and smaller than "double" seedlings.

(c) Precautions for seed bed sowing.—If sowings of doubtful seed must be made in a seed bed, the seed should be sown as thinly as possible and separate lots of seed should be sown in well separated seed beds in order to reduce the chances of black rot infection.

I. Black rot of stocks, of which the symptoms are described, is a seed-borne bacterial disease which spreads rapidly in the seed bed from plant to plant. Sowings made early in the season (December and January) are usually more severely affected than later sowings.

2. As a result of seed treatment experiments,

a four-hour treatment in 10 per cent. bleaching powder (calcium hypochlorite) is at present recommended for all stock seed not known to be

absolutely free from black rot.

3. The most important of the recommended control measures are the use of healthy seed and of clean seed-bed soil. Where the seed is of doubtful or unknown origin it should be treated for four hours in a 10 per cent. bleaching powder solution and, if practicable, sown directly in the

#### Acknowledgments.

The writer wishes to acknowledge his indebtedness to Dr. L. Fraser for helpful assistance, to various growers and seedsmen for the provision of seed and facilities for experimental work, and, in particular, to Mr. O. Majan, of Arthur Yates and Co. Ltd.

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#### Rural Bank Essay Competition Prizewinners.

Frank Nicholson, "Ross Ilill," Inverell, has been awarded first prize in boys' section, and Jean Matuschka, "Bogunda," Walbundrie, first prize in the girls' section of the Rural Bank's essay competition for Junior Farmers.

The first prize for boys is a 3-year scholarship at Hawkesbury Agricultural College, and for girls fees and material for the women's handicrafts 4-year course at Sydney Technical College.

Other awards in this competition are as follows:-

Second prize (£5 5s.): Russell Knowles, Dunoon, via Lismore.

Third prize (£2 29.): Desmond McKenna, Cowra-road, Grenfell.

Consolation prizes, each £1 1s.: Ronald Jurd, Tenterfield; Gordon Yabsley, Coraki; Stan Holt, Carlingford; Ronald Macrae, Collingullie; Donald Gillies, Brushgrove.

GIRLS.

Second prize (£5 5s.): Miss Betty Martin, Gleniffer, via Bellingen.

Consolation prizes, each £1 1s.: Miss Velvy Holding, Cunningar; Miss Gwen Osborne, Aldavilla, via Kempsey: Miss Daphne Mayo, Gerringong; Miss Vera Badley, Sebastopol; Miss Gwen Sanders, Griffith; Miss Jessie Fryer, Kyogle.

#### Paragraphs and Notices.

#### Inoculation Plus Preventive Measures.

THERE is, unfortunately, a tendency to look upon vaccination as the sole requirement for the prevention of losses from diseases which such treatment has been developed, writes the Chief of the Division of Animal Industry (Mr. Max Henry), who goes on to point out that the capacity of any vaccine to immunise is relative only, and the immunising capacity is liable to be broken down under circumstances particularly favourable to a high degree of infection. There is always a tendency where vaccination is adopted to forget what have been aptly described as the "homely tasks of preventive medicine." Preventive medicine in these cases often involves methods of animal management, and such measures can go far to assist in securing satisfactory

results from immunisation, while to neglect them can at times go far to negative those good effects.

Mr. Henry's statement was made in support of a recent comment by an Inspector of Stock in the central tableland district, who reported an increase in the number of cases of entero-toxaemia. Preventive inoculation had been carried out almost generally, but some recent cases of the disease had indicated again that inoculation alone was not sufficient to reduce mortality to nil, especially when lambs had access to a plentiful supply of very rich feed. Supplementing such feed with roughage either by handfeeding or alternate grazing on improved and natural pastures was essential.

#### Dipping for Cattle Tick.

#### No Loss of Production.

In our November issue we printed figures for the Kyogle tick quarantine area showing that, notwithstanding regular dipping and a dry year, butter production was well above average.

Mr. W. M. L. Hughes, of Ramornie Station, Upper Copmanhurst, now supplies further convincing evidence that production is not decreased by regular dipping.

Copmanhurst area went through ten months' dipping campaign from September, 1938, to June, 1939. On Ramornic Station there are seven large share dairies, each milking from 60 to 120 cows. For the corresponding ten months prior to eradication, that is, from September, 1937, to June, 1938, butter production was 88,086 lb. and rainfall 4,221 points. For the ten months

fortnightly dipping period (September, 1938, to June, 1939) the output was 98,133 lb. butter and the rainfall only 2,999 points. For the corresponding ten months of the following year (September, 1939, to June, 1940) production was 102,686 lb. butter and rainfall 2,772 points. For the fourth similar period 89,592 lb. butter was produced on 3,002 points of rain.

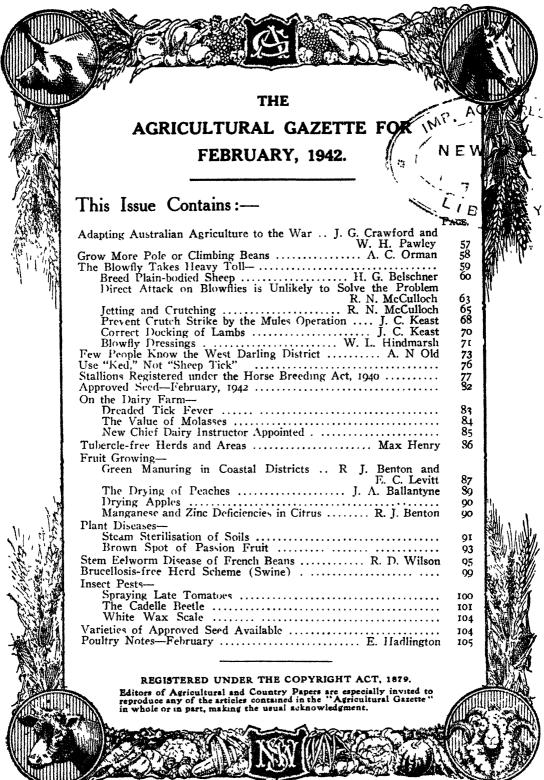
"During the summer months of the eradication period," states Mr. Hughes, "our cream was taken to the factory five days per week, or twenty times per month (two dippings each month), and the closest examination of the factory books failed to indicate on which of the twenty days the two dippings took place."

#### Elected to Potato Growers' Council.

THE poll taken for the election of members of the Potato Growers' Council resulted as follows:—

No. 1 District (Northern Rivers): William W. Fuller, of Grafton. No. 2 District (Central Coast): William F. Washington, of North Dorrigo. No. 3 District (Hunter,

Manning, Metropolitan and South Coast): Harold A. Swane, of Milperra. No. 4 District (Southern Tablelands): William Lowe, of Roslyn. No. 5 District (Central Tablelands): James Moad, of Millthorpe. No. 6 District (Northern Tablelands): Harold Starr, of Weerona, Guyra.







The Agricultural Gazette.

February, 1942.

# Adapting Australian Agriculture to the War.

J. G CRAWFORD, M.Ec., and W. H. PAWLEY, B.A.\*

FOR over two years Australia has been faced with the duty of organizing her agricultural resources in order to make the most effective contribution to the war. Recent events have accentuated the urgency of this task. We are now practically face to face with a powerful and malign antagonist. Between this country and our enemy stand only a few strong outposts. Much of our commerce passes through seas harassed by her navy and through seas dotted by enemy air bases. Many of our eastern markets have come, or may come, under her control.

ALL this means a great deal to Australian agriculture. The export of many products has been a problem of increasing difficulty throughout the war. This, perhaps the major problem of Australian agriculture, will certainly be accentuated. It is even possible to envisage temporary circumstances in which it would be very difficult to get exports away at all. Some rather essential

raw materials for agriculture (e.g., fertilisers) have already become scarce and may become scarcer. The growing requirement of the war industries and the fighting forces for men means that the decrease in the supply of labour available to agriculture may become as major a factor in determining agricultural policy as export difficulties have been.

#### Two Big Problems Complementary.

Fortunately, the export difficulties and the labour shortage are complementary problems to a great extent. From a national point of view shortage of labour on the farm is obviously a less serious thing when it is difficult to dispose of what is being produced than it would be if we were losing markets otherwise open to us. Nevertheless this does not make the farmer's personal problem of making a living any less acute, and this is referred to again below. The important thing from the national point of view is that the fact that much agricultural production tends to be surplus provides an opportunity as well as a problem to Australia if rightly seen. When we consider how vital is the supply of man-power to the munitions factories and the defence forces, we must surely consider it fortunate that we have in Australia major industries which can produce far in excess of our domestic needs and considerably in excess of the needs of our allies in many cases. Wheat, sugar, lamb, and apples are products which leap to mind as examples of this. It is true that the supply of sufficient food for Australia, for Britain in the case of the items she wants, and for the armies is the first duty of Australian agriculture. In some instances, such as cheese and vegetables, this imposes upon our tarmers the duty of in But the second duty of creasing production agriculture is to spere resources (men, petrol, etc.) not needed for fulfilling its first duty for other war necde.

<sup>\*</sup> Mr. Crawford is Economic Adviser to the Department of Agriculture, and Mr. Pawley is Acting First Assistant of the Department's Division of Agricultural Economics.

#### Farms Must not be Neglected.

If, however, agriculture does make a contribution in this way to the war effort by turning over all non-essential resources to other industries, Australia has an obligation in return to agriculture—and indeed to itself. This is to see that the ability of our rural industries to produce at the pre-war scale is not impaired by neglect of farms. Weeds must be kept down, machinery, buildings and fences must be kept in repair and the number and quality of stock must be maintained. Fortunately this would require much less labour than it takes to carry on production. But it is important to organise those who remain on the land, both for these maintenance purposes and for carrying on the normal operations of the farms. Something in the nature of co-operative groups each attending to several farms in a collective way might be considered. Much unwanted wheat land could be beneficially and cheaply sown to pasture for the period of the war as a method of weed control and to combat erosion.

#### Maintaining Rural Incomes.

So far we have regarded the subject of agricultural policy from the point of view of the national needs and these, of course, must be para-

mount. But we need also to consider how any policy works out from the individual standpoint. What of the problem of maintaining rural incomes? To a large extent what we have said already answers this question. Up to a point, agriculture is a vital war industry because its products are needed for food and clothing, and so far as there is a market for rural production the problem of income looks after itself. Other workers will be needed to see that productive capacity of the farms is not impaired. But a large number of "farmers" will secure their incomes for the period of the war in quite different capacities from farming.

Farmers, agricultural experts, and policy-makers alike must recognise that no simple slogan is applicable to all rural industries. Some industries make their contribution to war by increasing output, some by changing to production of an allied but different type of product, some by reducing production and transferring resources to non-rural uses. Adapting agriculture to the war means above all having a policy that is sufficiently flexible to make it possible for agriculture to make all three types of contribution to the war effort.

#### Grow More Pole or Climbing Beans.

Pole beans are not grown to the extent they deserve in New South Wales. Practically all beans grown in this State at the present time, apart from those produced by home gardeners and growers in the Anna Bay district, are confined to the dwarf French bean variety, most of which are of only average quality. The dwarf varieties appeal to growers because they are comparatively easily grown and return heavy yields. The pole beans, however, have many advantages over the dwarf varieties and should in my opinion be given more attention.

Besides giving heavier yields pole beans are a better quality, being particularly suitable for canning and are more disease resistant than the chief commercial dwarf varieties. In addition, the beans are more easily gathered than French beans. The chief objection to the pole beans is the labour involved in creeting supports, but to a large extent this is offset by the advantages referred to. There are several useful varieties, of which Epicure is perhaps the most popular. The pods are comparatively straight, smooth, medium length and very

good quality. The variety is a particularly heavy yielder, 600 bushels per acre having been obtained by some growers.

Kentucky Wonder is also a popular variety, but it is likely that it will be replaced by White Seeded Kentucky Wonder, known also as Fardenlosa and Glory of Summer. The plants of White Seeded Kentucky Wonder closely resemble Kentucky Wonder, but the pods are smoother and much less constricted between seeds. The pods are long, greener in colour than Epicure and stringless. The variety is earlier than Epicure.

Although it is not advocated that pole beans be grown exclusively, it is thought that growers could use them in conjunction with the dwarf varieties. In regard to sowing, it is usual to sow seed 6 inches apart in rows 3 to 4 feet apart, in much the same manner as is adopted for French beans. The beans are usually supported by long stakes cris-crossed in a row or with wire netting or other suitable materials.—A. C. Orman, Senior Agricultural Instructor.

War Gossip is Dangerous.

Guard Your Tongue.

# The Blowfly Takes Heavy Toll Of Sheep and Wool Industry.

Losses Can be Reduced by 80 per cent.

IF Australia's sheep and wool industry is to overcome or avoid the dangers which beset it, no factor which tends to lower efficiency or increase costs can afford to be neglected even for a day longer than is necessary.

One of the heaviest burdens shouldered by the industry is the £3,000,000 loss caused each year by the sheep blowfly. That figure must be well below the actual total, for, as every sheepman knows, it is impossible to assess all the indirect losses due to the fly nuisance. Reckoned on the basis of wool production alone, the blowfly factor adds approximately one penny a pound to the cost of production.

At least 80 per cent. of this annual loss could be prevented almost immediately by all sheepmen applying the present-known very practical methods which science has evolved to control and prevent blowfly strike. Above all things, owners are warned against pinning their faith to any one method of attack; an intelligent combination of all the best-known measures is necessary. These methods are concisely covered in the series of articles which follows.

#### Proved Methods of Control.

Research in the last decade has clearly demonstrated the futility of attacking, with the object of completely wiping out, the fly itself, but investigations have just as effectively proved the worth of such measures as the breeding of plain-bodied sheep, the "creation" surgically of plain-breeched sheep by the use of the Mules operation. and the effectiveness of preventing fly strike by jetting and crutching and by the correct docking of lambs. Even after applying all these methods of combat, some cases of fly strike will still occur. Handdressing of the strike areas offers a partial solution of this problem.

There is unfortunately an all-too-common tendency to regard as inevitable problems which have been allowed to persist for any length of time. The blowfly problem is far from inevitable. If lack of knowledge is the main factor delaying general application of the combative measures designed for the solution of the problem, then the Department of Agriculture and co-operating bodies are determined to remove that obstacle.

Refresher schools to perfect Departmental officers in blowfly control have been, and will continue to be, held in various country centres. After attending these schools, the officers will organise, and invite sheepmen and their organisations to arrange, demonstration groups. Parallel with this form of intensified extension work on blowflies will be issued informa-

#### An Intolerable Burden.

£3,000,000 a year at least is far too big a loss to be borne by even a major industry. Yet that is what the blowfly is costing the Australian sheep and wool industry.

With certainty the annual loss can be reduced to one-quarter. And what is more, this huge saving can be effected cheaply and expeditiously.

Read the articles on the various aspects of blowfly control in this issue, and ..... decide right away to adopt the measure recommended.

tive articles and press publicity. Sheepmen desiring further advice should contact the local District Veterinary Officer, Sheep and Wool Instructor or Stock Inspector.

Apathy or unwillingness to co-operate in this concerted drive on the blowfly are about the only factors which can militate against its success.

#### Breech Wrinkles Invite Fly Strike.

### Breed Plain-bodied Sheep.

Much Less Attractive . . . to Blowfly . . .

Little Effect on Wool Production and Quality.

H. G. BELSCHNER, D.V.Sc.

BLOWFLY strike in sheep does not occur by chance, nor is it related, except in a very minor way, to the health of the sheep. It has been definitely proved, as a result of research work carried out over many years, that the most important single factor which determines predisposition to breech strike in merino ewes is the degree of wrinkliness of the skin in that region. In the case of body strike, the conformation of the withers and the "quality" of the wool predispose the sheep to fleece rot, which attracts the fly.

Sheep most commonly struck in the breech region (crutch strike) show wrinkled breeches, and conversely sheep which usually remain free from crutch strike have plain breeches.

Body strike in sheep depends almost entirely upon the pre-existence of fleece rot, and this occurs most commonly in sheep of faulty conformation, particularly of the withers, and in sheep carrying a particular type of wool.

#### A Long-term Project.

It is evident, therefore, that the question of whether sheep are struck or not-whether it be in the region of the breech or on the body -depends very largely on the predisposition of the individual animal. When we consider the different types of merino sheep in Australia and their origin, any plan for selective breeding towards the ideal sheep of good conformation, carrying a big fleece of good quality wool, and not predisposed to fly strike, must necessarily be carried out gradually, and will take some time to achieve.

#### Wrinkly Breeches Inherited.

It has been shown that the tendency to a plain or wrinkly breech conformation is inherited and that the proportion of sheep with wrinkly breeches in a flock can be reduced by careful culling and mating. Experimental work has, however, not continued far enough to determine the permanency of these results in a flock. Other factors have also to be taken into account, the most important of which is environment.

#### Tendency Towards Plain-bodied Merinos.

Fortunately, considerable progress has already been made by Australian merino breeders towards the elimination of excessive wrinkliness in merino sheep. For a good many years the tendency among breeders generally has been to breed towards a comparatively plain-bodied type of sheep, and it is interesting to note that there has been diminution in the wool yield of our merino flocks. This change from the heavily developed and wrinkly type of sheep has been brought about since the beginning of this century. Evidence of the Vermont strain is, however, still to be seen in certain of our flocks.

#### Wool Not Adversely Affected.

There is a difference of opinion amongst sheep breeders as to the advisability of breeding sheep of still plainer conformation by paying more attention to wrinkles about the breech region. Investigational work so

#### FEBRUARY 1, 1942.]

#### [THE AGRICULTURAL GAZETTE.



Wrinkly Breeched Ewe



Plain Breeched Ewe.



A Typical Case of Body Strike.

far carried out supports the contention that there need be no marked difference in the wool production and quality of wool of the plain-breeched and wrinkly breeched type of sheep. Long-range breeding and genetic experiments along these lines are at present being undertaken

#### Plain Breeched Rams in Demand.

The movement amongst study to breed away from breech wrinkles appears to be accelerating, and many buyers in this State and the elimination of certain definite faults. In spite of this, however, undesirable qualities appear in a large percentage of the progeny. Anyone examining a number of flocks of merino sheep must be impressed with the variation in the extent of wrinkling of the breech which occurs, and the large number of undesirable sheep from the aspects both of wool and conformation, amongst the wrinkly-breeched sheep Lack of uniformity of conformation and





and Queensland are now demanding rams with plain breech conformation

Sheep with the excessively wrinkled breeches are generally the most undesirable sheep in a flock, quite apait from their predisposition to blowfly strike. These animals usually are less robust, produce a lower percentage of lambs and invariably carry uneven fleeces

#### Cull Undesirable Types.

So far as is economically possible flocks are classed and culled more or less heavily, chiefly for type of wool, density of fleece

wool are equally important when one considers predisposition to fly strike on both the breech area and the body of the sheep.

Whilst at the ordinary sheep classing, many ewes and rams showing the faults of conformation and wool which predispose sheep to blowfly strike are culled, it is considered that if more attention were paid to breech wrinkles, faulty withers and yellows or harsh wool, both in rams and ewes, the general quality of the flock as a whole would be raised and the amount of blowfly strike considerably reduced.

(Continued on page 94)

# Direct Attack on Blowflies Is Unlikely to Solve the Problem.

R. N. McCuiloch, B.Sc., B.Sc.Agr., Entomologist.

IN the light of investigational work carried out during the last ten years, notably at Canberra, it has been necessary to revise somewhat drastically previously held ideas regarding the merits of practices such as the breeding of parasites, carcase destruction, poisoning and trapping, etc. The reduction by these means of blowfly numbers to the point where strike is controlled is now considered impracticable.

Some difference of opinion still exists among sheepmen as to the species of flies which cause the damage. Lucilia cuprina, the "green fly" which frequents sheepyards, is usually bronzy-green in colour and larger than a house fly, but smaller than the brown blowfly. It is responsible for about 90 per cent of all strikes, the other 10 per cent. being caused by the common brown blowflies. The hairy-maggot fly (blue-green in colour and larger than cuprina) does not cause strikes, in fact, it is incapable of starting a strike, although it can quickly kill a sheep on which cuprina has begun the damage

Blowfly Pest No. 1.

In its development L. cuprina passes through three stages —

The eggs are creamy-white. banana-shaped and one-twelfth of an inch long. They are deposited in bunches of 150 to 250 stuck together. The maggot hatches from the egg after twelve to twentyfour hours and feeds on meat (not vegetable matter) for about five days. It casts its skin twice. and when it is past the second moult it can develop into a fly, even if removed from food: on a sheep's body (which

favours fast development) the second moult can occur two days after hatching. Fully formed maggots normally leave sheep when four or five days old.

The pupa, the brown chrysalis in which the body of the fly is built up, is found in the soil where the maggot has buried itself.

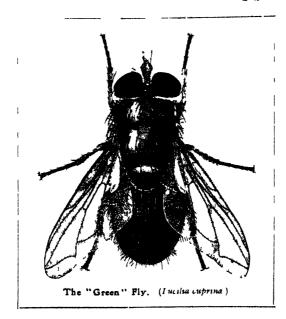
Speed of development depends mainly on temperature. The full life-history (egg to egg-laying adult) takes about three weeks in summer. A female can live for three months and produce 3,000 eggs, so that the possible speed of multiplication is prodigious.

#### Where Do Flies Breed?

Carcases were at one time considered to be the breeding-ground of sheep blowflies;

and rabbit poisoning was blamed for blowfly increase. Recent work by officers of the Council for Scientific and Industrial Research has disproved this.

In carcases, intense competition for food is particularly severe on Lucilia caprina, the chief sheep fly. A dead sheep, exposed and infested normally, produces thousands of hairymaggot flies and amazingly few--less than twenty— L. cuprina. A similar carcase exposed



for two days and then protected from flics by screening or burying, produces thousands of L. cuprina.

A badly-struck sheep, however, may produce as many as 5,000 L. cuprina up to the time of dressing, and a small strike may result in several hundred. The badly-struck sheep has been dropping hundreds of full-fed L. cuprina maggots daily, for several days before it is dressed. It has been shown that the crutchings from an average strike will breed more of the flies that matter, than all the carcases on a property, in normal times.

#### The Effect of Moisture.

Though the sheep's body temperature leads to fast development of maggots in a strike, it is also a very real defence against the beginnings of strike, because blowfly eggs and young maggots cannot stand dry heat.

At 95 deg. Fahr. (about the temperature of the fleece) eggs need a wet atmosphere or contact with free moisture to survive. That is, on sheep they depend on free moisture, which comes chiefly from urine. Urine gets on to the skin and fleece because of breech wrinkles, dags, or long wool.

Green feed means more urination and slower drying than dry feed, and it may cause scouring. Frequent rain can make the fleece (often on the withers) wet enough to allow strike to develop, which explains why waves of body-strike are comparatively rare and, though devastating when they do occur, not nearly so important as the much more regular waves of crutch strike.

Many eggs are laid on sheep without strike developing. The crutch has been damp enough to attract flies but not to hatch the eggs. Dead egg-masses can be found on the crutch wool in almost any flock.

#### The Control of Fly Numbers.

Wasp parasites of blowflies are not now expected to give control, because the most promising ones have failed in the past, and because L. cuprina breeds chiefly on the

living sheep and so escapes the attention of parasites which are frequenters of carcases. Blowfly numbers are not kept down by parasites anywhere in the world.

Carcase destruction cannot be expected to control sheep blowflies when, as set out above, a strike produces so many more L. cuprina than a carcase, and strikes almost always greatly outnumber carcases.

Poisoning and trapping have never been shown to give economical control, though it is possible that better baits and traps may still give results in the future. Large scale experiments have shown that trapping can give a 50 per cent. reduction in strikes, but at a concentration of one trap per 25 acres which was uneconomical. To compare or compete with other methods of protecting sheep, trapping would require revolutionary improvement.

If we study the effects of sheep management on the blowfly population, we find:—

- (a) Hand-dressing, with one mid-season crutching, breeds L. cuprina in huge numbers.
- (b) Jetting reduces the flies that breed from a flock, but under normal conditions the "small strikes" of a practical jetting programme breed many flies.
- (c) Crutching so often that sheep do not get struck, will go further towards eliminating the flies that matter.
- (d) The outstanding method of reducing the population of L. cuprina is to have the sheep as plain-crutched as British breeds (by breeding or by the Mules operation which will reduce strikes by 90 per cent.) and crutching or jetting in addition.

The object of station management, however, is not to reduce flies—it is to protect sheep. The best way to protect sheep is the way that costs least.

More detailed discussion of blowfly population problems may be found in Report No. 2 of the Joint Blowfly Committee, and in various pamphlets of the Council for Scientific and Industrial Research.



# Why it pays to feed "Meggitt's to Ewes on Poor or Dry Feed

"Meggitt's" in the Ration means:—

## (1) EASIER LAMBING

# MORE MILK FOR LAMBS

A supplementary ration consisting of approximately 4-oz. of Meggitt's Pure Linseed Sheep Muts per day to ewes on poor quality feed, much more than pays for itself, because it reduces mortalities at lambing, makes it possible for the swe to produce sufficient milk to rear healthy lambs, and at the same time enables the flock to produce a sounder, heavier

Poor dry feed does not supply the nutrients required by swes immediately before, and after lambing, because it is deficient in protein. Moreover, its fibrous nature causes digestive mureover, its nuruns means unuses unuse Megatit's is rich in protein (it contains 30%), and it also contains 6 % of Linseed Oil, well known for its larative, medicinal and conditioning effect. Its content of vegetable mucilage is also of great value in assisting the action of the oil in preventing binding up. Weakith, spaceps a Asia jude becoming of moisture in the sheep's digestive tract, and in this respect has the same action as the

# (3) REDUCED MORTALITY

# (4) Healthier, Better Grown Stock

consumption of a large bulk of succulent pasture. It is for these reasons that Meggitt's is the best of all milk-producing concentrates, and the most effective and supplement for sheep on dry feed. \*conomical

# Meggitt's Linseed Oil Meal for Trough Feeding

Meggitt's Linseed Oil Meal has exactly the same composition and feeding value as the nuts. Those graziers who are trough feeding will find the former more convenient for use, if other feeds or salt are also being supplied. On dry feed, 4-Oz. per ewe per day of nuts or meal is sufficient to ensure satisfactory results. If lambs are also consuming portion of the ration, a heavier rate of feeding may be neces-Of course, if there is a green pick with the dry feed, a lighter ration would prove

Supplies are available through your produce merchant, general store, stock and station agent, or direct from Meggitt Ltd.

Manufactured from Pure Linseed from which portion of the oil has been extracted by

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Fig.

# BE READY-

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JETTER & FIRE-FIGHTER

THEY SAVE LABOUR . .

THE NEW MODEL

2C508

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high pressure jetting and
capacity to throw a heavy

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The 2C508

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This shows the famous Edgell Cutoff fitted with the B-W multiple et nozzle and strainer. The nozzle that never clogs. For fires a directing nozzle is fitted in place of the multiple jet.

stream of water for fires.



Fig. 532. Double-acting high-pressure Pump, complete with pulley; easily run by small engine or other belt power.

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"Everything for the Man on the Land."

# Jetting and Crutching

#### For the Prevention of Blowfly Strike.

R. N. McCulloch, B.Sc., B.Sc.Agr., Entomologist.

JETTING, or the spraying of the crutch (usually) so as to "fill the wool" with a mixture poisonous to blowfly maggots can, if used systematically, be made to do away almost completely with hand-dressing.

Work by officers of the Entomological Branch of the Department—development of calcium arsenite mixture, multi-jet nozzles, an improved race, etc.—has effected considerable improvement in jetting technique, and this has played an important part in the wider interest and use of jetting in New South Wales in recent years. Jetting with calcium arsenite gives practical protection for five weeks



Operator Wearing Face Screen, Canvas Sleeves, Rubber "Utility" or "Canning" Gloves and Holding a Five-jet Nozzle.

#### The Programme Recommended.

For sheep shorn in July or August the following jetting programme, tested for five years on a practical scale, has given every satisfaction.

Jet all flocks when they show strike, or better still, the threat of strike, in the spring. Repeat the treatment as the sheep need it, until the heat of summer stops fly activity, or until crutching. Crutch at about the beginning of March. Jet in the autumn when strikes appear, and repeat as required till winter, or, exceptionally, till shearing. Try to be ahead of the flies all the time and aim at never dressing for crutch strike.

In practice this programme may mean five jettings in the year—rarely more and usually less.

Jetting does not prevent all strikes. Within two weeks after treatment a few sheep can show small patches. Some of these "dry off"; some strikes increase in size, but slowly. The number of small strikes in a jetted flock increases as the days go by, and a few of the older strikes begin to affect the sheep's condition by about five weeks. This is the stage at which to re-jet the flock. This involves jetting struck sheep, which may often number 10 per cent. of the flock and under some conditions a much larger proportion. Neither the small strikes nor the re-jetting of small strikes (with precautions discussed in departmental leaflets) reduces production from the flock. The programme is very much less harmful than the unavoidable bad strikes of a handdressing policy.

#### Jetting and Hand-dressing Compared.

Experiments at Trangie and Moree have shown that this programme of one crutching systematic jetting as compared with one crutching and hand-dressing.

(a) Saves labour—overwhelmingly. With adequate plant, normal station labour should be able to muster and jet all flocks in about ten days, though this time will vary with the type of country. By hand dressing all station labour works incessantly on "flies," while the strike wave lasts.

- (b) Saves sheep.—It almost eliminates strike deaths. Deaths from strike under hand-dressing vary greatly, but may be severe. In a bad period at Moree they were about twenty times as numerous under exceptionally thorough hand-dressing supervision, as they were under "practical" jetting supervision.
- (c) Saves wool.—The weighing of several thousand fleeces from tagged sheep has shown that small strikes, such as occur

the Mules operation. In some seasons the plainness itself may prove sufficient protection in many districts.

Jetting injury can be serious. It is very rarely caused by anything except excessive pressure. Methods of avoiding, pressure-injury are described in departmental leaflets.

Body strike is sometimes advanced as an argument against both jetting and the Mules operation. This is illogical, since crutch strike is incomparably the most important





The Portable Race in Use in a Temporary Yard at Lambing Time.

on jetted sheep, do not reduce the clip, while bad strikes, unavoidable under "bottle and shears" management, do.

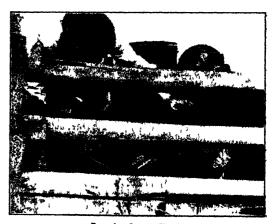
#### Jetting Costs.

For Mixture.—With calcium arsenite prepared on the station, five jettings may be done for 1d., if waste 1s re-used. Home made sodium arsenite costs slightly less, but the protection is not quite so good.

For Plant.—Interest and depreciation is less (usually much less) than id. per head per annum

#### Other Factors.

Mating has been shown not to be affected by jetting, but lambing is more difficult. One can jet a week or two before lambing and again at lambmarking. This leaves a gap of two or three weeks towards the end of lambing when protection is incomplete. It is sometimes possible to divide the normal lambing into two periods to allow a jetting between, but it is practically certain that the best way in which to guarantee protection through the usual lambing of six or seven weeks is to have ewes as plain in the crutch as British sheep and to jet just before lambing. They can be made plain by breeding or



For the Small Flock.
The operator in a floored branding race with the sheep.

part of the blowfly problem. Jetting has been used against body strike (with a reduced concentration of arsenic), but its employment in this way cannot be expected to increase greatly, because of the difficulty of iorecasting waves of body strike.

#### Jetting Machines.

There are many good machines on the market at (complete) from £20 for a handpump, to £140 for the biggest power unit.

An excellent outfit is a powerful pump with tank, hose, etc., at £50—£60 to be driven by an engine already available on the property. (A jetter rarely works for 200 hours in a year.) Such a plant is suitable for flocks of 5,000 to 25,000. The smallest complete jetters at £55 to £70 have given excellent service for flocks of 3,000 and upwards but are naturally slower in the delivery of liquid than the more powerful machines Hand-jetters can be made to do excellent work.

Generally, it pays more than handsomely to have a jetter almost too big rather than too small. The biggest jetters allow the use of the fastest nozzles which alone make possible the jetting, thoroughly, of 250-400 sheep per hour, by one hose.

#### Departmental Leaflets on Fly-control.

Leaflets available on application comprise Report No. 2 of the Joint Blowfly Committee, which deals with all phases, and a separate leaflet on jetting. These describe: Jetting mixtures—methods and programme; protection for the operator; multi-jet nozzles; silt traps and sieves for cleaning waste mixture; a raised portable jetting race with complete plans, excellent for a three-man team.

#### Crutching.

In tests crutching has always been better than jetting, treatment for treatment. It requires no extra plant.

Objections to repeated crutching as the main defence against strike are:—

- (a) The difficulty of arranging labour at short notice.
- (b) The cost—over 2d. per head per treatment.

(c) A reduction in value of crutch wool, of about 1d. per head for each crutching after the first.

For small properties, however, where normal station labour can cope with the work, possibly by neighbourly co-operation, crutching has outstanding merit. Anyone with a flock of 3,000 or less should consider the two—jetting and crutching—most carefully.

It should be borne in mind that a double crutching is not fly-control. To handle flies by crutching as well as can be done by the five-weekly jetting programme, one must be prepared to crutch three or four times in the year. If this involves contract labour, the differences between the costs of the two methods is obvious.

It is worth emphasising that strikes have their beginnings on the inner or "medial" folds of the crutch or on the tip of the tail, and it is waste of effort to insist on a "wide" crutching when those inner areas are left, as they often are on "C" class sheep, with an inch of brown wool. The most important thing in crutching is to clean the area where urine-staining allows strike to start.

#### Forecasting Fly Waves.

Control by jetting and crutching would obviously be simplified if fly-waves could be foretold with accuracy. Beyond the knowledge that spring and autumn are the chief danger periods in New South Wales, and that wet weather and green feed encourage strike, accurate forecasting will probably remain impossible. In any district the best judge of the immediate future prospects of fly activity is usually the man who jets. He has studied the matter more than his neighbours, and he knows the importance of being prepared.

#### **GUARD YOUR TONGUE.**

You may pass on a minor piece of information that is harmless in itself, but linked with other pieces it forms a dangerous chain of rumour.

#### Remove Breech Wrinkles Surgically.

# Prevent Crutch Strike By the Mules Operation.

J. C. KEAST, B.V.Sc., H.D.A., Pastures Protection Boards' Research Officer.

A CONSIDERABLE amount of information has been published on this subject since the operation was first suggested by Mr. Mules, of South Australia, in 1931. Although some authorities have pointed out certain disadvantages in the general adoption of the Mules operation it must be agreed that no single means of rapidly rendering sheep less predisposed to crutch strike can compare with it.

In controlled field trials the Mules operation has always given satisfactory results, but the degree of protection afforded has varied in the different tests In a recent extensive trial, where a similar line of sheep was divided into a plain-breeched group, a wrinkly-breeched group untreated, and a wrinkly-breeched group which was "Muled," it was found that the wrinkly-breeched group which had been operated upon suffered fewer strikes than the original plain-breeched sheep. In other words, this operation rendered wrinkly-breeched sheep known to be predisposed to flystrike actually less susceptible than sheep known to be relatively not predisposed to strike. In the same trial, for every strike recorded in the treated group there were twenty-three strikes among similar but untreated sheep. Other workers have reported that the operation reduced the susceptibility of "C" class sheep (wrinkly breech) to approximately that of "A" class sheep (plain breech). These results speak for themselves and show that a very high degree of protection from crutch strike is produced by the Mules operation.

#### Remove Medial Breech Folds.

The operation involves the surgical removal of the two medial crutch folds which run down each side of the vulva. The removal of each piece of skin commences at the side of the butt of the tail and runs down some inches below the vulva, leaving

a wound approximately 6 inches long and 2 inches wide at its widest part, which should be opposite the bottom of the vulva. The operation is best performed with a pair of sharp dagging shears, and with a little practice operators can efficiently treat at least 100 weaners per hour. The wounds, which appear comparatively large, heal rapidly without assistance, and they are not



Performing the Operation.

[Aust. Wool Board Photo.

particularly attractive to blowflies. Nevertheless, it is advisable not to operate during severe fly waves, nor should the operation be carried out while bush flies are active (midsummer to late autumn) as these small flies are attracted to fresh wounds of any description and cause infection with delayed healing of the wounds.

#### When to Operate.

Sheep of any age may be operated upon, but by treating when young the sheep enjoy comparative immunity over a longer period and at a time when they are most susceptible to strike. Marking time is a most convenient time to operate on lambs, as no additional handling of the sheep or additional labour is required apart from the operator. It can be carried out with little interference with the normal marking routine, but has the disadvantage that the older lambs may be carrying a fair amount of wool. This may result in some inefficient operations and subsequent re-treatment of a percentage of animals. Weaning time also offers a good opportunity if the sheep have as possible. The operation should never be attempted if the wool over the breech is more than I inch long.

Small sheep are most conveniently handled by holding over a rail as for lamb marking, except that the hocks are kept bent so as not to tighten the skin over the breech area. When heavy sheep are being treated, it is much easier for the catchers to sit the sheep up on the floor of the shed and have the operator standing below on the ground. When large numbers of adult sheep are being "Muled," special cradles for holding the sheep can be made.

Some sheep usually require re-treatment and these may be found by closely examin-





been crutched or shorn, and shorn weaners are probably ideal sheep on which to operate. With weaners or lambs it is usual to treat all sheep irrespective of their breech development. Unless adult sheep are particularly susceptible to fly it may not be considered worth while operating on them. If it is decided to operate, however, it will probably be sufficient if only the wrinkly-breeched ones are treated.

#### Operation Easy to Perform.

The operation can be performed most easily and efficiently when the breech has only a short growth of wool, and particularly for beginners it is advisable to operate as soon after shearing or crutching

ing those sheep subsequently struck to ascertain if any portions of the medial wrinkles still remain. These may then be retreated at the time of dressing the sheep, or if many sheep are involved it may be more convenient to isolate these struck sheep in a hospital paddock until the strike wounds have healed and then re-treat as required.

The Mules operation is easy to perform and anyone can become proficient after a little practice. The method of performing the operation is well illustrated in a publication which may be procured from the Australian Wool Board, or demonstrations may be arranged by the local Stock Inspector or Sheep and Wool Instructor.

#### Length of Tail an Important Factor.

# Correct Docking of Lambs Vastly Reduces Crutch and Tail Strike.

I. C. KEAST, B.V.Sc., H.D.A., Pastures Protection Boards' Research Officer.

THE results of a number of trials conducted by the Council for Scientific and Industrial Research during the last few years have definitely shown that the length at which lamb's tails are removed at marking time is one of the factors which influences the susceptibility of the sheep to blowfly strike. The control of breech strike, therefore, starts at marking time, and incorrect marking will increase the susceptibility of sheep for life.

Generally speaking, among sheep whose tails have been cut short there are at least twice as many crutch and tail strikes as in sheep in which the tails have been docked long. A short tail is one which does not reach the upper angle of the vulva, while the long tail extends below the tip of the vulva. The long tails are those which have been cut through the third or fourth joint, and, when marking, it is advisable to examine a number of lambs after removing the tail to make certain that the tip of the tail reaches below the bottom of the vulva.

Long tails in lambs are not popular with fat lamb breeders, as the long tails have a tendency to hide the development of the hind-quarters. However, it must be realised that those primarily interested in the blowfly problem are the mermo men, and the fly is not as important in cross-bred sheep.

#### Less Trouble with Marking Wounds.

The little evidence that is available also suggests that long tailing reduces the incidence of strike in marking wounds. This is probably due to the decrease in the amount of muscular tissue actually cut as the tail length increases, resulting in a smaller wound which heals more readily. The marking wounds also heal more readily and consequently are less prone to fly attack when the lambs are marked at an early age, and when the amputation is made the joint and not through the through bone. Another factor of importance is reducing fly susceptibility is to leave a flap of skin on the underside of the tail. This is effected by pushing the skin on the

underside of the tail towards the body of the land with the knife blade before the actual cut is made. This leaves a comparatively woolless portion of skin to heal over the end of the tail and so helps in preventing urine soiling of the wool on the tail tip.

#### Dressings Generally Unnecessary.

Except for one small trial carried out by the C.S.I.R., showing that citronella oil was of value in reducing strikes following marking, there is no other information to indicate that lamb marking fluids are of any practical value for the treatment of the marking wounds. Except in periods of severe fly activity marking wounds are not particularly attractive to blowflies, but when lambs are struck the strikes usually occur between the second and seventh day after marking. The application of any marking oil for the prevention of strikes would therefore have to be repellent to flies during this period, and no dressings have yet been found completely satisfactory in this regard. Marking wounds generally heal well without assistance provided they have not been contaminated by dirty instruments or dirty swabsticks. The proper disinfection of the marking instruments together with absolute cleanliness during the operation are essential measures for preventing infection. The application of dressings will, in most cases, merely delay the normal process of healing. The use of dirty swabsticks on marking wounds cannot be too strongly condemned, as they have been responsible for a number of heavy mortalities in recently marked

# Sayers DRENCH-or-VAX



This entirely automatic wonder instrument can NOW

be used for Inoculation Vaccination

and for administering all Sheep Drenches including Nicotine and Bluestone (Blu-nik) and Carbontetrachloride (Green Seal).

The price is 85/-, including Inoculating Needle, Measuring Glass and Drenching Nozzle, etc.

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The self cleaning triple braced bars of 'Trak Grip' are CONTINUOUS This powerful backbone in the traction zone means extra power Also, the heavy reinforcing of each lug prevents their tearing off when travelling over hard, rough ground stony outcroppings, stumps, etc. This circumferential and lateral bracing explains the total absence of casing trouble with Dunlop 'Irak Grip' Tractor Tyres a

# TRACTION LEARS ONLY FULL-WIDTH EXTRA LUG BAR LINCHAGE SELF CLEANING MORE LUG BARS LOAD EYERLY ORS TRIBUTED OVER LUGS TRIBUTED OVER LUGS

## TO 60 MORE LUC-BAR INCHES AND UP TO 60 MORE LUC-BARS IN 'TRAK-GRIP'

Because of the continuous construction of the lug bar a tractor equipped with Dunlop 'Frak Grip has up to 300 more! I g has inches than if fitted with any other tyre.—This extra lug bar inchage increases traction remarkably—reduces overall wear. Trak G ip has also up to 60 more lug bit per tyre. This means a smoother transmission of engine power to drawbit power.

**DUNLOP** 

"TRAK-GRIP" TRACTOR TYRES

Greater Traction . . . Better Cleaning . . . Longer Wear

## Blowfly Dressings.

#### B.T.B. Probably the Most Effective.

W. L. HINDMARSH, B.V.Sc., M.R.C.V.S., Director of Veterinary Research.

NO matter what method or combination of methods are used for the prevention of fly strike, some sheep will be struck and must then receive attention. When the number of sheep so struck is small, or when stud sheep are involved, hand-dressing is usually preferred. Hand-dressing, however, is expensive and time consuming, and where a large number of sheep are struck general treatment such as crutching or jetting should be adopted.

When hand-dressing is carried out it is first of all necessary to shear the wool from the struck area, taking care also to clip the wool from any area to which the maggets have tracked from the original strike, and also to remove the clean wool for about one inch around the margin. It is an advantage to clip the wool around the strikes so as to slope it back. The part is then dressed with a preparation which will—

(a) Destroy or remove any maggots that are left.

(b) Discourage any flies which attempt to deposit again.

(c) Not retard the normal process of healing

#### No Dressing Entirely Satisfactory.

A fully satisfactory dressing for fly struck sheep has not yet been discovered. A great number of substances and combinations of substances have been tried and in many cases have been highly recommended by their makers, but none has been found completely effective when submitted to critical tests. Sheepowners should be wary of extravagant claims made for blowly dressings.

Many substances are known to be poisonous to maggots, but in almost all cases they have undesirable properties which prevent them from giving complete satisfaction. Some are liable to poison the sheep, some by their irritant nature tend to increase the damage already done by the fly, some rapidly lose their effectiveness after application, some are detrimental to the surrounding wool, and others are difficult of application.

#### Be Cautious of Extravagant Claims.

The search for a dressing which will effectively repel flies and thus prevent re-strike for even a limited period (especially if the fly is very active) has not been successful, and claims in this regard should be accepted with caution. Investigations are still proceeding with certain preparations which have some repellant nature. Any dressing which tends to keep the injured part dry, however, will reduce the likelihood of further strikes developing.

In spite of the disadvantages above mentioned, there are several dressings which can be used with benefit, although in periods of severe fly activity are not so likely to be effective.

The following points should be observed:—

I. Frequent inspection of the flocks so that early strikes will be detected and treatment adopted immediately.

- Paddock inspection and dressing are not so effective as inspection in yards and drafting off of struck sheep.
- 3. Shearing of struck area and search for pockets to which maggots may have "tracked" are necessary.
- 4. The dressing should be correctly applied. It is important that the dressing should penetrate the wool readily and not run off. It is best to work the dressing in with the hand. With a viscous dressing, swabbing it not satisfactory.

(Continued on page 72.)

#### Horse-breeding Act, 1940.

#### Stallion Re-registration Due Shortly.

APPLICATIONS for the re-registration of stallions under the Horse-breeding Act, 1940, should be made before 1st March next. Application forms will be sent to all persons who registered their stallions last season. The prescribed registration fee is f3 3s. except where the stallion has been previously registered under the Act at or after its fifth year of age, in which case the fee is £1 1s. Persons whose stallions will be two years of age on 1st August next are required to give notice of such stallions and, if they intend to use them for breeding purposes with other people's mares, they must be registered. All persons who have stallions of which notice has not yet been given to the D-partment must furnish such notice and, if the stallion is to be used for breeding purposes only with their own mares, a permit will be issued entitling the holder to so use the stallion up to 31st August, 1944, after which date the stallion may be kept only if registered. Where a permit is issued, no fee is payable nor is any examination necessary. Any person who holds a permit in respect of any stallion which he now desires to register should forward an application for registration and pay the prescribed fee of £3 3s.

#### BLOWFLY DRESSINGS.

(Continued from page 71.)

#### Useful Dressings.

The following dressings are useful.

Boracic Acid.—Probably the most useful chemical for incorporation in fly dressings is boracic acid. It is relatively cheap and does not harm the tissues. As a powder it is not easy to apply to crutch strikes, and when first used in solution it was found difficult to prepare compounds which contained sufficient boracic acid to be effective. This has been overcome in more recent work. Boracic acid powder, however, is satisfactory for the dressing of strikes about the base of the horns of rams.

B.T.B. Dressing.\*—This dressing, introduced by officers of the C.S.I.R., has already been fully

B.T.B. Dressing.\*—This dressing, introduced by officers of the C.S.I.R., has already been fully described in this Gazette (see August, 1941, issue). There is difficulty at present in obtaining one constituent, tar oil, but tests with a substitute are being conducted. This is probably the most effective dressing yet compounded, but it has not yet been tested under severe fly wave conditions.

yet been tested under severe fly wave conditions.

Zinc Sulphate Compound.—This dressing, described in the October, 1939, issue of this Gazette, gave good results in early field trials, but

has failed in severe fly waves. Care is necessary in its preparation, for if the carbon tetrachloride is not thoroughly mixed it may scald.

Bluestone Solution.—This dressing has been widely used. It is a good dressing, but has the disadvantage of staining the wool. The presence of bluestone-stained wool depreciates the value of the fleeces.

Proprietary Dressings.—Numerous dressings are on the market. The different brands vary in efficacy, but many have been reported upon favourably by graziers. Some stockowners prefer to purchase a ready-mixed preparation, and they must be guided by their own experience in the selection of the brand which they use.

\*Since this was written the officers of the C.S.I.R. have reported that the following can replace the tar oil originally recommended:—

 259 Kerosene					-	
Oil 48 Kerosene						

#### Official Recordings of the Department's Herds.

273 Days' recording completed during December, 1941.

Cow.	Sare.	Owner	Age at beginning of test.	Milk.	Aver- age test.	Butter fat.
			yrs. mths.	lb.	per cent.	
one of the contract of the con	Australian .	Illawarra Shorthorn				
Mature Cow			,	1		
Cowra Grace 3rd	Berry Lone Star	Grafton Experiment Farin	5 5	5.0114	41	241'44
		Aurshire.				
Mature Crws					1	
Grafton Rosamond .	Grafton Valiant .	Cowra Experiment Farin	5 4 .	12,624	3.0	406-40
Grafton Ivv and	(grafton Gael	,, ,,	5 6	6,8601	4-1	283:30
Bathurst Witch	Lynburn Garety's Lad .	21 11	5 7	(,942	40	275.75
Junior 3 years				1,54	-	-7575
Grafton Sierta	Lessnessock Naphtha	1 ,, ,,	3 4	8,4752	3.8	318-41
Senior 2 years	• • • • • • • • • • • • • • • • • • • •		, ,	147.5%	J	3 4-
Grafton Pink	Gowrie Park Scottish Pen	1 , ,	2 8	5,860	48	280-23
_	naut.	1			1	-
Junior 2 years		!	ł	1	- 1	
Grafton Carnation 5th .	Lessnessock Naphtha	, ,,	2 5	6,912	4.4	304.04
		Guernsey.				
Mature Cows		G MIT/1900y.				
Wollongbar Moss Rose and	Wollongbar Liberal	Wollongbar Experiment	8 0	9,079		
Wondingsan Moss Mose 310	Wondingon' Elberni	Farm.	8 9	9,0791	4.6	420:24
Wollongbar Karama	Wollongbar Hopeful .	1	99	6,2531	5.0	
Junior 4 years	Trongon Itopotal	, , ,	9 9	0,4238	2.0	313.34
Wollongbar Thyme	Wollongbar Warrior	,, ,	4 3	5,5871	5.5	305.93
Junior 2 years	.,	" "	* 3	313072	23	303.93
Wolloughar Kitty	Wonderful Standard of Les	,, ,,	2 5	5,511	5.0	274.48
	Pieces Lodge			3,3	30	-/4 40
Wollongbar Valencia	Valentine's Galore 4th of	,, ,,	2 4	5,478	4.9	270-61
	Maple Lodge.	" " 1	I	3.4/0	77	4/0 01
Wollongbar Skylark		, , ,	2 3	5,990}	43	257.98
	Pieces Lodge.	, 1	•	1	- 1	-
		Jersey.				
Mature Cow-		1 1	,	1		
Wagga Clare	Wagga Comfort's Heir .	Wagga Experiment Farm	5 1	6,099	5·X	312-13
	1			-,,-	J	3-4-3



The Darling River, Upstream from Bourke.

# FEW PEOPLE KNOW THE WEST DARLING DISTRICT

A. N. OLD, B.Sc.Agr., Analyst.

WEST of the Darling River and extending to the borders of South Australia in the west and Queensland in the north lies an area representing about one-fifth of New South Wales; a vast and interesting region of which all too little is known to the population of the more easterly portions of the State; a region of varied and often unique features, having its own special problems and perhaps a future of much greater significance than has generally been supposed.

The greater part of the area consists of plains, some two to five hundred feet above sea level, composed of material accumulated on a vast scale by water and wind action in recent geologic time. Rising above the general level of the plains are mountain ranges and isolated residuals of older rocks of varying age, the ranges having a general north-and-south direction. Most important of these are the Barrier Ranges, which have a general level at Broken Hill of 1,000 feet above sea level; Mt. Robe, probably the highest point in the west Darling district, reaches 1,550 feet. These ranges includes some of the oldest of the world's rocks.

Rocks chiefly of the Cretaceous age belonging to the Mesozoic (or middle) geologic era are extensively developed in the Tibooburra-Milparinka, White Cliffs, and Wanaaring-Bourke areas, rising as low hills and ridges. Siliceous cappings of porcellanite or "Grey Billy" are a common feature of rock formations of various ages throughout the area and form part of the "Duricrust"—a name given by Dr. Woolnough to this general type of occurrence which is widely distributed on the Australian continent.

A striking feature of much of the northern part of the area is the development of white quartz gravel on the surface of the soil, giving such places the name of "snow country."

The Darling is the principal river, although it cannot be said to drain the area, for most of the run-off does not reach the stream, being lost by evaporation and soakage. Western tributaries (Paroo, Warrego, etc.) reach the river only rarely. Typical features of a mature river valley, such as anabranches, billabongs and lakes, which fill only during floods, are in evidence. The drainage of most of the area is effected by creeks, which carry water only after heavy storms and which belong to a series of inland drainage systems characterised by swamps and lakes. In many cases the creeks branch to form dis-tributaries and become "lost" before reaching the lakes.

Features of the climate of the area are low rainfall, generally 8 to 10 inches, low humidity, high summer and low winter temperatures, a wide daily as well as yearly temperature range, frequent strong and dusty winds, and a very high evaporation rate. This latter is usually estimated at 7 feet per annum, roughly eight or ten times the rainfall. Of equal importance with the amount of rainfall are considerations of incidence and reliability, a few good storms being preferable to several light showers. Often a storm will be sufficient only for germination and good early growth; if a second storm then occurs a good season is assured, but in its absence the benefit of the first storm is often nullified.

#### The Water Problem.

Transcending all other problems of the west Darling is that of water supply. There is little doubt that in future years some of the large scale schemes which have been proposed from time to time in connection with our inland rivers will be put into effect with far-reaching results to areas such as the one under consideration.



Tin Ore from Euriowie.

There would appear to be no reason preventing the ultimate development of extensive irrigation projects along the lines of that centred on Mildura, less than twenty miles away. It is informative to compare Mildura, having a population of 22,000 (including the surrounding district), with the west Darling town of Wentworth, seventeen miles away, with a population of about 1,000. In future irrigation schemes no doubt the lessons learnt at Mildura will be applied After a number of years serious salt trouble threatened the future of the town; however, a complete underground drainage system was instituted, successfully controlling the salt content of the irrigated soil and assuring the future prosperity of the district. Any new irrigation scheme undertaken, in this vicinity at least, will doubtless incorporate similar provision for drainage

A small beginning to increased water conservation is the recent decision to construct a weir at Menindec; this will provide for a considerable extension of the horticulture already carried on there. The city of Broken Hill, the third city of New South Wales, and by far the largest town of the west Darling, provides a ready market for this produce.

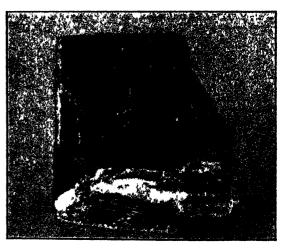
#### Public Watering Places.

An important section of the Department of Agriculture's activities not as well known to the public as it deserves to be is the provision and maintenance of public watering places on stock routes. These are of especial importance west of the Darling. Apart from the pastoral aspect, their extension could be amply justified for strategic reasons.

According to local circumstances, either bores or excavated tanks are provided. A typical tank has a capacity of some 20,000 cubic yards and is sunk on a gentle slope, which it drains by means of shallow excavated channels, which are often run out half a mile or more from the tank. The water is received first in a silt tank, a smaller excavation on the upward side, which collects most of the silt brought down. The silt tank is connected to the main tank by a concrete pipe through the bank, and the water then passes down a Ushaped fibro-cement runway, which extends to within a few feet of the tank bottom and saves the batter or sloping wall of the tank from being cut away by the unflowing water.

A windmill is crected on the bank and the water pumped into one or two large iron tanks of, say, 20,000 gallons, mounted on concrete blocks. These tanks are connected to iron troughing some 150 yards in length, from which stock are watered. The completed tank is fenced, shade trees being included where possible. Periodically when the need and opportunity arise, the tank is de-silted, and if corrosion of the iron tanks and troughing occurs, they are concrete lined.

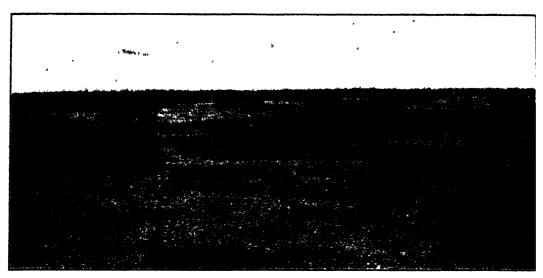
Compared with bores, tanks have certain disadvantages, among which are —Possible difficulty in securing a site either as regards catchment, or suitability of the ground for giving a waterholding bottom at the requisite depth; silting of the channels and tank by wind-borne and waterborne sand, heavy loss by evaporation, and necessary dependence on rainfall. There is therefore a tendency to prefer bores where suitable water is available by boring. Some bores have a sufficient



Lead Ore (Galena) from Broken Hill.

flow to maintain a supply for stock, others are provided with a windmill. The water passes to large iron receivers and then to troughing as in the case of the excavated tanks.

All strongly flowing bores struck nowadays are provided with closing gear to conserve the artesian supply. Many older bores, however, have been flowing continuously for many years, wasting great



So-called "Snow Country" west of Tibooburra. The white Patches are due to pebbles and fragments of Quartz.

quantities of water. Most of them would probably require re-casing, etc., before closing gear could be effectively used. From the viewpoint of water conservation it is highly desirable that such action be taken as early as circumstances permit. As an example, the Clifton Bore on the Milparinka-Bourke road is still flowing, after some fifty years, at the rate of 500,000 gallons daily, the water, apart from a very small proportion used by stock, being allowed to run to waste.

Of Australia's thirteen artesian basins, two are represented in the west Darling district—the Great Artesian Basin in the north, and the Murray Basin (chiefly sub-artesian) in the south. Boring is not, however, confined to the basins, successful bores fitted with windmills being in operation in other parts.

In the sands below the watercourses, particularly along the anabranch of the Darling River north of Wentworth, and large creeks like Stephen's Creek, ground water is successfully tapped by wells at depths up to about 60 feet. The anabranch itself with its associated lakes, and the other lakes throughout the area, such as Lakes Cobham and Bancannia, are of considerable value as water providers for stock for some time after receiving rain or river water. The Darling itself is, of course, used by travelling stock, though its steep banks present difficulties to the watering of stock direct from the stream.

#### Transport.

Next in importance to the water problem is perhaps that of transport, particularly in view of petrol rationing. The sight of two holes in the ground side by side, one a well, the other a charcoal pit, eloquently illustrates the two major problems of the region. Perhaps timber has not been used to any great extent for charcoal, but it is most regrettable that it should be used at all.

Sand in dry weather and boggy conditions after rain present obstacles to travelling on natural surface roads, and doubtless the future will see a great increase in all-weather highways, permitting speedy transport by heavy trucks, a development which will do much to ensure the prosperity of the area. In particular, an important highway seems likely to develop, linking Broken Hill through Tibooburra with south-west Queensland.

There is no doubt that the aeroplane is destined to play a great part in the future of the area for passenger and mail transport, heavier goods being carried by motor truck. This development must for the most part await the conclusion of the war

#### Erosion.

A third problem facing the Darling district is that of erosion, primarily by wind, but also by water. Over-stocking, the destruction of natural vegetation, droughts, rabbits and mistletoe have combined to produce conditions which in parts approach the danger point. The restoration of trees, shrubs and grass by the exclusion of stock from certain areas for a few years would appear essential.

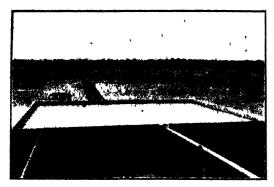
A disturbing feature of the vegetation of the area is the large number of dead and dying mulga trees to be seen, and the scarcity of young trees to replace them. The mulga and saltbush are of outstanding importance to the pastoralist as fodder plants; sheep are often maintained on the half-dry leaves which drop from the mulgas, even in the entire absence of grass.

in the entire absence of grass.

The city of Broken Hill is justly proud of its reclamation scheme pioneered by Albert Morris, a local botanist, and sponsored by mining interests. Thousands of trees and shrubs, both native and introduced, have been established south and west of the city, to protect it from wind and sand.

#### The Future of the District.

That there are difficult problems for the district cannot be denied, but these difficulties can be, and, to a reasonable extent, are being solved. Water conservation, adequate transport facilities and erosion control are perhaps the three basic needs. In this connection a better understanding of the far west, its importance as an asset, and the special problems with which it has to contend, is necessary. In the absence of such understanding by the rest of the State, the voting power of the relatively small population of the west Darling does not give it a voice in the country's affairs commensurate with the significance of the area, even from the viewpoint of the State as a whole.



Iron Water Tank and Troughing.

The average dweller of eastern New South Wales has very little knowledge of the district, except perhaps of Broken Hill, the publicity given to the area being usually confined to accounts of phenomenal heat, dust or drought, and the reactions of far west children on first seeing the sea The real "story" of the far west still invites the attention of press and cinema.

Quite apart from the more obvious potentialities of the pastoral and mining industries and of irrigated agriculture, the area is capable of providing a unique tourist route, given improved roads, hotels and aerodromes, for it presents a number of features not to be found together in any other part of the world.

In addition to the interest attaching to the rivers, lakes, hills, plains and mirages, the semi-arid types of vegetation, the relatively abundant wild life, and historic towns, there are such special features as the Broken Hill silver-lead-zinc mines, the deserted tin mines of Euriowie, the opal fields of White Cliffs and Lightning Ridge, the flowing bores of the great artesian basin, and the highly interesting gold-bearing and fossiliferous area of Milparinka-Tibooburra. The Victorian irrigation town of Mildura is just outside the area, as is also the radium mine at Olary, in South Australia.

Better use should be made of the educational value of the area in geography, botany, zoology and geology. There would probably be as much value, educationally at least, in sending city children on trips to the far west as there is in bringing far west children to the city.

Living conditions in the far west depend to a great extent on the individual. In some cases people have apparently convinced themselves that they live in a desert and have done little to combat the natural conditions; others have made the necessary effort to provide almost all the amenities of the easterly cities. Apparently small items such as electric fans, fly-proof doors, refrigerators, sand-proof fencing (of galvanised iron), tree-planting, etc, together with the telephone and wireless, assume great importance. An interesting development is the use of wind-power to generate electricity, as at the Tibooburra Hospital and many stations. In Queensland, electricity for lighting and to power shearing plants has been generated from the pressure of artesian bore water.

The Flying Doctor and Bush Nursing Association services, and the use of wireless transceivers (transmitter-receivers) are features worthy of special mention. The correspondence school system here, as in other parts of the State, is of outstanding value.

It is not for any one individual, as a result of a brief visit, to make specific assertions about so large and varied an area, but there can be no doubt whatever that its potentialities have not been fully realised and that scientific planning by the authorities and interests concerned will make this portion of the State one of added value and importance.

#### Use "Ked," Not "Sheep Tick."

One of the two common external parasites of sheep is a wingless fly (Melophagus ovinus). This parasite has two common names, "sheep tick" and "ked." The term "tick" as applied to it is erroneous, as it does not belong to that group.

The fact that true ticks at times infest sheep, is leading to considerable confusion

in the minds of many, owing to this erroneous nomenclature.

In order to end this confusion readers are asked to restrict the use of the word "tick" to true ticks, and to popularise the name "ked" for this parasite. It is a word which is widely understood throughout the English speaking world.

#### Help Win the War. Buy War Savings Certificates.



Proper Cultivation of lucerne and pasture fields makes the distribution of artificial fertilizers and animal manure more effective. Cultivation also holds and absorbs summer rainfalls to stimulate and extend seasonal growth over a much longer period, enabling stock carrying capacity of pastures to be greatly increased.

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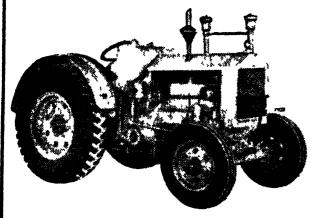
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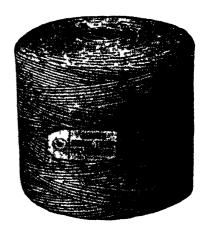
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Address.

Owner.

#### STALLIONS REGISTERED

#### Under the Horse Breeding Act, 1940.

(Continued from page 20.)

HEREUNDER is the list of stallions registered under the Horse Breeding Act, 1940, until 31st August, 1942, and these are the only stallions which may be used for breeding purposes, with the exception of any thoroughbred horse entered in the Australian Stud Book and any stallion for which a permit has been issued, provided that it is used with its owners' mares only.

Every owner of a stallion must, not later than 1st March next, forward to the Chief Veterinary Surgeon, Department of Agriculture, a notice giving particulars of his stallion, and if the stallion is to be used with mares not his own apply for registration on forms obtainable from the Department.

The abbreviations used in the following list are:—
Cl—Clydesdale; Tr—Trotter; Pe—Percheron; Py—Pony or Welsh Pony;
Ab—Arab; Th—Thoroughbred or Blood; Dr—All unclassified draught stallions; Ga—Galloway; Lh—Light; Abx—Arab-Cross; Sr—Shire; Sp—Suffolk Punch; Cb—Cob; Pa—Pacer.

## Registered Stallions in the Area Controlled by the District Veterinary Officer, Orange.

#### Bathurst Pastures Protection District.

Ourner.

Address.

Name and Breed of

Name and Breed of

Owner.	A auress,	Stallson.	(raner.	A 44763).	Stallion.			
Atcheson, H. G Britt, J. V		. Uncle John (Cl).	Kyalla Investment Co.	Orange	Hillend Mac (Cl).			
Byron, T. R Clark, W. S	Katoomba	. Unnamed. (Th). . Desire (Th).	Kyalla Investment	Orange	Athley Terry (Cl).			
Crawford, J. S. R	Orange	Rob Roy (Cl).	Miligate, H. D					
Cunyngham, H. C. Frewin, J. E	^	. Glenroy (Cl), Starwyn (Tr.)	Mutton, A. E Roger, J. M	The Lagoon Oberon	Dandy Jim (Py). Brunstane Duplicate			
Grannall, W. R	Springside .	Bonnie Mickey (Tr).			(Cl). Yarrawa Majorslade			
Harper, B. G Jenner, J	Mt. David Forest Reefs	. Ras Tafarı (Ab) Farleton Elect (Cl).	Stocks and Sons	Dathurst	(C1).			
Kingham, P. A Knight, A. E	Millthorpe . Mt David	. Downs Reality (Cl). . Silver Baron (Cl).	Warty, R	Sofala	Silver Sheen (Th).			
		Canonha Pastures	Protection District.					
Birchell, W. J. D	Nyngan	. Tommy (Py).	Menzies, J. A	Nyngan	Wattlebank Bold			
Jones, H. A. and E. M.	Warren	. General Keynote (Cl).	Skinner, M. H. F	Nevertire	Baron (Cl). Rajah (Ab).			
	.Girilambone .	Roseneath Refiner	Walsh, J	Mullengudgery Nyngan	Jalengla Tony (Py). Dainty Jim (Py).			
	• • • • • • • • • • • • • • • • • • • •	(CI).		Nyngan	Grey Ken (Th).			
		Carcoar Pastures 1	Protection District.					
Dandalan D 17	T am dhaant	. Cleveland Flash Dal-	Johns, S	Blayney	Belmore Flash Nor-			
Bardsley, F. K		more (CI).	•		val (Cl).			
Brien, A. G Bryant, R. T. and	Cowra Billimari	. Fairview Reliable (Cl). . Prince Crysendo (Th).	Jukes, V. S	Cowra	Carradale Cameronian (Cl).			
E. A. Capps.			Roche, W	Cowra	Parliwidgec Aristo- crat (Cl).			
Ellery, M. J	Mandurama	. El-Katif (Ab).		Porter's Retreat	Bill Cottingham (Th),			
Ellery, J Gavin, A. J	Mandurama Walli		Sopp, M. A. E Sparke, W. C		Aquitanı (Th). Wattles Footprnit			
Hall, A. K. A	Tuena		Sparae, W. C.		(CI).			
Condobolin Pastures Protection District.								
Bassett Bros	Fairholme	. Loudon Supreme (Cl).	Staniforth, W. E Stokes, H. D	Condobolin Tullibigeal	Good Too (Th). Blighty Colonel (Cl).			
	Tullamore	. Peerless Renown (Cl).	Taylor, K. V	Eureka Park	Kippidene (Cl).			
Cole, A. A Cooke, C. E	Ungarie Condobolin		Thompson, A. G		Roseneath Knight (Cl).			
Davies, J. T	434	. Woorilla Standard (Cl).	Wales, W. B. H	Tullibigeal	Cleveland Sensation (Cl).			
Dept. of Agriculture	Condobolin	. State Duce (Cl).	Weir, D	Wyalong	Boree Stylist (CI).			
Fuzzard, C. F. and	Gubbata	. Mudda Rocks Mac (Cl).	Weir, D Wilson, S. H	Wyakong Weja Siding	Prince Leopold (Cl). Decside Refiner (Cl).			
****		,/-			Page 77			

## Registered Stallions in the Area Controlled by the District Veterinary Officer, Orange—continued.

#### Coonabarabran Pastures Protection District.

				CONGCULTACTAN L'48141	es truscuson d	1347	16.		
Owner.		Address.		Name and Breed of Stallion.	Owner.		Address.		Name and Breed of Stallion.
Agnew, L (Est.)		Binnaway		Mascot Bonnie Val	Leader, R	•••	Piambra Baradine	•••	Seamark (CI).
Fallon, P		Curban		(Py). Netherley Randell	Rice, R Rodgers, W. P.	···	Piambra	•••	Show Boat (Cl).  Glenwood Scotch  Tide (Cl).
Law, C		Armatree		(Cl). Briodale Chief (Cl).	Skuthorpe, W. M.	E.	Gulargambone		David (Py). Sultan (Cl).
Leader, R		Piambra	•••	Highway Automark (Cl).	Smith, R Wilson, S. R.	···	Tooraweenah Gilgandra		Prince of Buchlynie (Cl).
				Coonamble Pastures	Protection Dist	rict			<b>(</b> ** <b>/</b> *
Byrne, E. H.		Coonamble		Underworld (Th).	Pennel, H		Coonamble		Janitor (Py).
Cunneen H. C. Jones, A. E.				Golden (Tr). Tondeburine Oliver (Cl).		E.	Coonamble	•••	Salazar (Th).
				Dubbo Pastures Pa	rotection Distric	t.			
Baker, P. J.		Geurie	•••	Wangoola Leader (Cl).	Knowles, C. B.	•••	Wellington	•••	Avonvale Bombardier (Cl).
Bragg, C. K.		Mungeribar	•••	Clevedon Glenalbin	McDonald, A. I	ł.,	Dubbo	•••	Prince Nedj (Ab).
Dawes, J Dawes, A. C.	···	Narromine Balladoran		(Cl), Ellenville Style (Cl), Cloverdale Douglas		•••	Eumungerie Eumungerie		Scotstoun Laurie (Cl). Scotstoun Majestic
Dept. of Agriculty	ıre	Dubbo		(CI), State Hitler (CI).	Mack, G		Trangie		(Cl). Ruby Rob King
Edmunds, C. R.		"Willow Pari	k,''	Craigs Style (Cl).	Scott, A. K.	•••	Dubbo		Lionel (Th). Abbotsford Gallant
Grimes, J. C.		via Gulgong, Collie		Noble Child (Tr).			Trangie		(Cl). Victor Childs (Tr).
Henry, A. C. Jefferis, L. B.		Wongarbon Tullamore		Majid Pasha (Ab). Frisco Gold (Tr).		•••	Geurie	•••	Korangah Bold Mac (Cl).
Estate Late E. Je		Trangie	•••	Naroo Fireboy (Py).	Whillock, A.	•••	Geurie	•••	Highland, Winalott (Cl).
				Forbes Pastures Pr	otection District				
Allez, H	•••	Trundle		Jollie Shield (Cl).		•••	Caragabal	•	Don Mike (Py).
Bennett, A. E. Clarke, E D K.	•••	Forbes Nelungaloo	•••	Jollie Comrade (Cl). Mintons Son (Tr).			Garema Tullamore	•••	Red Gala (Th). Moppity Monarch (Cl).
Clarke, E. D. K.	•••	Nelungaloo	• • •	Machine Steps (Tr).		•••	Trundle	•••	Bowan Beneficeut . (Cl).
Diprose, L. T. Ervin, W. J.	•••	Greenethorpe Trundle	•••	Fine View Scotty (Cl) Lowan Confidence		•••	Grenfell		Jokers Joy (Py).
Gray, H. V.		Goolagong		(Cl). Woodlands Gay Boy		· · ·	Cowra Eugowra	•••	Little Gem (Py). Moppity Hero (Cl).
Gollan, J. R.		Grenfell		(Cl). Howewa (Ab).	McMahon, M. E.	•••	Forbes Eugowra	•••	Night Watch (Cl). Shahran (Ab).
Gollan, J. R.	•••	Grentell	•••	Al Borak (Ab).	Maloy, J. J. N.S.W. Pastoral C	o.	***	•••	Craigends Pride (Cl).
Hawick, S Hawthorn, W. J.	•••	Grenfell Old Grenfell	• • •	Love Watch, (Cl). Lulu Bye (T1).	Ltd. Rees, H. W.		Daroobalgie		Arab Boy (Py).
Heaton, R Hockey Bros.		Parkes Bogan Gate		King Bee (Th). Pine Lodge William		•••	Forbes Parkes	•••	Risdon Revision (CI). Roseneath Gift (CI).
		_		Chief (Cl).	Welsh, W. J.	•••	Eugowra	•••	Happy Boy (Cl).
Hodges, E. F. a	ind	Cookamidgery	•••	Kircaldy Demolition (Cl).	*** * * * * * * * * * * * * * * * * * *	•••	Parkes Parkes	•••	Silver Jack (Py). Wirra Walla (Pa).
				Molong Pastures Pr	votection Distric	t.			
Bayliss, R		Yeoval	•••	Grey Marquis (Py).			Molong	•••	Manualuke (Ab).
Bowhay, C. Bruce, M	•••	Yeoval Cumnock		State Diplomat (Cl). Royal Knight (Cl).			Peak Hill Cargo	•••	Snow Cloud (Py). Comet (Py).
Bruce, M	•••	Cumnor k		Bonnie Royal (Cl).	Miller, K., and Tr	e-	Yeoval	•••	Netherly Beramac
Davis, A. W. Dick, R		Cudal Cumnock		Shield-Bearer (Cl). Boy-o-Mine (Tr).	main, C. Moore, N. H.		Pine Vale		(Cl). Crystalset (Cl).
Dumesny, W. H.		Alectown Alectown	•••	Happy's Image (Cl).	Rawsthorne, G.		Murga	•••	Clonelly Comet (CI).
Dumesny, W. H. Fuller, G. A.		Dripstone	•••	Electric Robert (Tr). Neupac (Th).				•••	Siva Nedj (Ab). Bold Machine (Tr).
Goodacre, J.	Ĥ.	Canowindra Mandagery	• •	Teddy Roi (Th). Lowan's Pride (Cl).	Whitehead, L. G	•••	Cumnock Suntop, via W	.;;	Echo-Tom (Py). Real Trip (Tr).
Hall, M. J. and J. Hando, W		Peak Hill	•••	Peak Hill (Tr).			lington.		• • •
Hinton, W. D.	•••	Wellington	•••	Tommy Le Roi 2nd (Py).	•	•••	lington.		Flying Wah (Tr).
Ivery, P Lye Bros	•••	Wellington Trundle	···	Prosperity (Cl). Jollie Aristocrat (Cl).	Wise, O	•••	Suntop, via W lington.	el-	Grey Rock (Tr).
				Mudgee Pastures Pr	rotection Distric	t.			
Besant, W. S.	•••	Ilford	•••	Prince Charming (Cl).				•••	Pride of Honour (CI).
Bowman, R. Brown, V. J.	•••	Birriwa Running Stream		Cormack's Hero (Cl). Socks (Ab).			Gu gong	•••	Victory (Th). Craighead Note (Ci).
Byrnes, A. E.		Mudgee	•	Netherby Raymond	A. W. Taylor.				
Byrnes, J. E.		Mudgee	•••	(CI). Frome Sea Raymond (CI).				•••	Craighead Flash (Cl). Whiskey (Py).
Cafe, O	•••		•••	Princendo (Th).	Oldfield, G	•••	Mudgee	•••	Netherton Norman
Field, J Grabham, A. J.	•••	TP	•••	Young Wuzzy (Lh). Billy Bon (Py).	Pitt, W. J		Mudgee	•••	(Cl). Little Peter Pan (Py).
									· •

Owner.

Address.

Address.

Name and Breed of

## Registered Stallions in the Area Controlled by the District Veterinary Officer, Orange—continued.

Mudgee	Pastures	Protection	District—continued.
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Owner,		Å diress.	Name and Breed of Stallion.	Owner.		Address.		Name and Breed of Stallion.
Pitt, W. J Pike, H. C.	•••	Mudgee	Millsville Lad (Th).	Todman, G. R.		Mudgee	•••	Tilecote Norman (CI)
Pike, H. C.	•••	Mudgee	Brooklea Confidence Superb (Cl).	Taylor, A. W.	•••	Olinda	•••	Shar-Hadz (Ab).
Scott, A. K.	•••	Hargraves	Disappointment (Th).	Wilson, H. D.		Mudgee		Dandy Charlie (Py).
Scholz, D. H.	•••	Warrangee Terrace		Wilson, J. K.		Ilford		Wassy 2nd (Ab).
Smith, C Smith, S. W. J.	•••	Canadian Lead Canadian Lead	Glenelg Majestic (Cl). Norbiton Norman	Windle, H		Rylstone	•••	Little Wonder (Py).
Canada, C. 111. J.	•••	Canadan Dona	(CI).	Windle, H	•••	Ryistone		Fidential (Lh).

## Registered Stallions in the Area Controlled by the District Veterinary Officer, Cootamundra.

#### Albury Pastures Protection District.

Owner.

Name and Breed of

(runer.	A daress.	Name and Breed of Stallion.	Owner.	A auress.	Name and Breed of Stallson.
Bahr, A. A., and Sons.	Henty	Farleton Crystal Lining (Cl).	Linder, P. J	Albury	Fenwick Athol Pat (Py).
Barber Bros	Walla Walla	Bull Plain Pride (Cl).		Pleasant Hills	Aladdın (Ab).
Bell, G. A Bromfield, E. M	Mullengandra Howlong	Valentine (Py). Carosion (LH).	Newton, T Reiff, L	Henty Albury	
Burge, J. R	Culcairn	Kirndeen Crystal (Cl).	Scholz, J. F		
Ellis, R	Walla Walla	Larundel Cresendo (Cl).	Schulz, H. R Schulz, H. R	Jindera Jindera	Stirling Lad (Dr). Stryver (Dr).
Fischer, H. T	Henty	Avalon Park Chief (Cl).	Severin, A. C., and Sons.		Greenbea Favorite
Graetz, H. A	Henty	Werrina Gift (C1).	Somervail, J. B	Culcairn	Wangoola Winmore
Haberecht, H. H Humphreys, J. K.	Jindera Albury	Larundel Hector (Cl). Wunnamurra Carry	Sutherland, W. A.	Jindera	(Cl). Court Craft (Tr).
Humphreys, R. J.	Culcairn	On (Cl). Glenelg Alick (Cl).	Yensch, A. and H. L.	Walbundrie	Dunholme Silver Tide (C1).
Jelbart, J. F	Stony Park East	Sirdar (Ab).	Young, S	Albury	Charming Derby (Tr).
		Corowa Pastures P	rotection District.		
Ball, R. B	Daysdale	Farleton Marabou (Cl).	Dickens, A	Corowa	Farleton Regal Tide (Cl).
Bott, F. B., and Sons.	Corowa	Bull Plain Ardene (C1).	Dunn, F. H., and	Corowa Berrigan	Silver Lining (Cl). Bold Winalone (Cl).
Carroll, P. P	Coreen	Limerick Vale Gold Dust (Cl).	Son. Flanagan, P. J		Marshall Knight (CI).
Grimmins, F. W	Oaklands	Meiralie Sunray (Cl).	Hav, L. H	Cobram Corowa	
		Deniliquin Pastures	Protection District		
Cockayne, K. and C.	Mathoura	Tamar Marquis (Cl).	Hawkins, E. C., and	Tocumwal	Balgreen Pioneer (Cl).
Falkiner, F. S., and Sons Pty. Ltd.	Conargo	Peter (Pe).	B. L. Hawkins, E. C., and	Tocumwal	Kawarau Strathslade
Hawkins, E. C. and B. L.	Tocumwal	Woolamai Review (Cl).	B. L. Hawkins, E. C. and B. L.	Tocumwal	(C1). Royal Mail (imp.). (C1).
		Gundagai Pastures	Protection District.		
Ball, W	Cootamundra	Bonny Tam (Py).	Hardy, W	Cootamundra	Bonny Bill (Tr).
Britt, W. J	Gundagai		Hogan, W	Tumut Junee	
Bromham, W. J	Tumbarumba	Cullivel Crystalwave	McKay, S. G	Oberne	Bonnie Earl (Th).
Butt, R. J. T	Mt. Horeb	(Cl). Jacko (Th).	Sephton, H Taber, F. A		
Grady, L. J. T	Adelong	Talvivian (Th).	Taber, F. A Trethowan, W	Cootamundra	Wunnamurra Bon-
		Hay Pastures Pro	otection District.		adventure (CI).
Tandina C W	Hillston			Coolmani	Ct Halana Cin Talaa
Jardine, C. H Johns, F. H	Hillston	Boree Master Primula	•		St. Helens Sir Toby (Cl).
King Bros Naismith, J. (Mrs.)	Tabbita Goolgowi	(Cl). Avonlea Nizan (Cl). Rex (Py).	Robertson, J Varcoe, B., and Sons	Merriwagga Hillston	Cymro (Py), Glenbower Flash Print (Cl).
11 minutes, J. (1811-17.11.11	_		<b></b>		(61).
	•	Jeril <b>derie</b> Pastures F			
Connell, P	Jerilderie	Woolsmia Dignity (Cl).	Millear, T., and Sons	Jerilderie	Sheik of the Desert (Ab).
Hodgson, W	Berrigan	(CI), Waldaria Gift (CI).	John Mills and Sons Mills, R	Finley	Craigie Malcolm (Dr).
Horton, L. B Marantelli, L. A	Tocumwal Finley	Cobber O'Mine (Tr). Carnlea Bold Imprint	Mills, R Moulton Bros	Finley Berrigan	(Not yet named) (11). Florentine (Cl).
	- micy	(CI),	Thornton, W	Berrigan	
					D 70

## Registered Stallions in the Area Controlled by the District Veterinary Officer, Cootamundra—continued.

#### Narrandera Pastures Protection District.

		Narranaera I	assures Prosection D	1317161.	
Owner.	Address.	Name and Bre Stallson.	ed of Owner.	Address.	Name and Breed of Stallion.
Allen, J. E	Murrami	Craighead Fa	vourite Longmire Bros. Longmire Bros.	Glenelg Glenelg	C1
Bunworth, W	Griffith	Rivington Fla	shlight Longmire Bros.		. Craigie Revision (Imp.) (Cl).
Clark, D. M. Cruickshank, V. J. Donaldson, S. Dunlevey, W. E.	Binya	Winston Walls St. Courier (T Wallace (LH).	h). McNaughton B O'Connell, J.		Gleneig Oscar (Ci).  Morialie Sundial (Ci).  Deepwater Camer-
Gilmour, I. M	Barcilan	(C1).	lmrster Peters, C. J. Pocklington, J.	Gundagai H Rankin Springs	onian (Cl). Donald (Pv). Fernbank Paper
Holden, T		Widgelli Foo	Pocklington, J.	H Rankin Springs	Money (Cl). Sultan (Py).
Irons, R. J		Riverma Knig Delroyal (Th).	Sewel, T. L.	I.ake Wyangan Narrandera	Glenairy Choice (Cl). Wannon Dignity (Cl).
		The Hume P	astures Protection Di	strict.	
Heywood and Webb		Woorinyan Kurri (Cl).	Kurri McAuliffe, N. F McNiven, A. R.	Kempsey	Sarjean (Tb).
Kendall, T. E	Holbrook	Netherly Bill (		_	Amoun (ry).
<b>7</b> 11 . 12 . D			stures Protection Dist		Deenwater Emblem
Farrall, W. R	Urana	Langside Silver (Cl).	Pride Smith Bros. Smith Bros.	Lockhart	Deepwater Emblem (Cl). Park Hill Craig (Cl)
		Wagga Pasti	ires Protection Distri	ct.	
Bauer, O. H. (Est.)	Wagga	Homebush In (Cl).	nperial Lehmann, E. W. McMahon, F.	Junee	Mont Walla (Tr). Glenbower Knight
Bray, C Brazil, M. F		Great War (Tr) Taradale Flash	Duke Michael, N.	Temora	(Cl). Wilverani (Tr).
Brunskill, T. V. and R. L.	Wagga	(Cl). Grand Choice (	Montague, J. A. Poters, D Phillips, W	The Rock Ariah Park Uranquinty	Gay Roy (Py), Royal (Cl), Bold Mac (Cl),
Cameron, W. J Cunnington, P.T		Barclay Admir. Black Mac (T1)	al (Cl). Pursehouse, H.	Mirool Beckom	Duke (Cl). Cleveland Craig
Dept. of Agriculture,		Jedran (Ab). Drumsagart (Cl		Matong	O'Maine (Cl). Glenelg Cavalier (Cl).
Wagga Experi- ment Farm.	•••	Emissary (Imp State Actor (Cl	).	Wagga	Redwin Modern Beau (Cl)
Finch, E. M. (Mrs.)		U State Emissarv Billy Boy (T1). Glenuna (	(Cl). Rutland, J. Golden Schirmer, H.	Walleroobie	Sunrise Flash Douglas ((1). Auto Direct (C1).
Guthrie, K.		Glenuna (Cl). Gleam (Cl). Braeside Norval	Slattery Bros.	Matong	Glencairn Alexander (Cl).
Harpley, E Harpley, L. J	Temora Temora .	Bundawarra (Ti King Roy (Pv).	furner, f. H.	Beckom Ariah Park	Maylea Baronet (Cl), Cumbrian Supreme (Cl).
Harris, W	Junee	(Py).	Walker, I	Ariah Park	Joe Cole (Tr).
Howard, H. D Jordan, C. W Kember, F	Yerong Creek . Junee Ganmain	Sir Echo (Py),	Wehrstedt, M. H	Temora L Gidginbung	War Realm (Tr). Rutland Flashlight (Cl).
Kirwan, M. J	Yerong Creek	(C1),	White, A. G.	Old Junce Yerong Creek	Murrulebale Flash (CI). Moraculus (Th).
		Young Past	ures Protection Distr	ict.	
Baxter, G. S Bragg, V. P	Wattamondara . Crov.her			Young Bendick Murrell	Royal Jim (Py). Cucum Silverlight
Cleverdon, H	Muirumpurrah .	Bonnie Jim (Pv	).		(Py).
Crichton, H. L	Young	Burradoo Dandy Kyle Majestic (	Cl). Leggatt, P. L.	Barmedman	Rivington Flash (CI). Natiai Jupiter (Py).
Crichton, H. L Croker, S		Kyle Prince (Cl Black March (T	). Marina, E. B. r). Minter, A. C	Young Barmedman	Moppity Cavalier (Cl). Rockleigh Caesar (Py)
Dowling, M. R Duffey, M	Marengo	Gold Mac (Th).	Minter, A. C.	Barmedman	Rockleigh Lad (Py), Rockleigh Boy (Py).
Dunnett, G	Murrumburrah .	. Pentland Silver	Minter, A. C. Slade Nixon, W. I. Nixon, W. I.	Barmedinan	Redwin Brilliant (Cl). Billabong Henry (Cl).
Forster, R Fowler Bros	Young Young		Pollard, R. A. leman Reynolds, F.	Rectton Maimuru Stockinbingal	Makari Jacko (Cl). Avonlea Banker (Cl).
Fowler, S. G. and Sons.	Monteagle .	(Cl). Dixte Noble (Tr	Riles, C ). Robinson, S.	Boorowa T., Monteagle	Bold Melrose (Cl). Waterview Baron Windermere (Cl).
Gee. E	Boorowa	Glenbower Flast (CI).	Spackman, R. 1.	Yannawah Harden	Makari Mister (Cl). Rajah (Ab).
Gurney, J Hall, W. J		Danny's Gift (I Boree Champion	Pv). Thackeray, H. C ((l).	. M. Young	Craigie Select (Imp.)
Hines, T. R Hughes, S	Thuddungra	Canetna Crystal Prince (Cl).	Thackeray, H. C	. M. Young . M. Young	Sunny Boy (Py). Craigie Hero (Imp.)
Hunter, A. F Hunter, J. D. A		Boree Swell (Cl). Arabo (Ab).	Webb, G. H.	Murrumburrah	(Cl). Kiaora (Cl).
	Stalle as	D	Owner Budden in	T7:-4:-	

## List of Stallions in respect of which Registration has been applied for by Owners in the Area Controlled by the District Veterinary Officer, Goulburn.

#### Berrima Pastures Protection District.

Owner.	Address.	Name and Breed of Stallion,	Owner.	Address.	Name and Breed of Stallion.
Akrigg, J. R  Lock, J. E  Lock, J. E  McLean, C. M  McLean, C. M  Mangold, B. M	Bowral Bowral Burradoo Burradoo Burdanoon	Gallant Alexander (Cl), Kairaki Baronet (Cl) Curroway Duke (Cl) Burradoo Rex (Py), Burradoo Pompadour (Py), Royal Sport (Th).	Pearson, T. E Ritchie, G. A Smith, C. O Smith, C. O The Marist Bros Wilson, D. and M	Robertson Bowral Bowral Mittagong Exeter	Sir Prizer (Cl). Reflection (Th). Footslade (Cl). Canmore (Cl). The Black Prince (Ct). Nattai Fascination (Py).
Bruce, N. L Cummings, A. A	Bombala Craigie	Bombala Pastures I Rushdon Gondolier (Cl). Buchlyvie Prince (Cl).	Protection District.  Jenniugs, R. C Stewart, D. J Taylor, W. F	Bibbenluke Cathcart Cathcart	Brown Prince (Cl). Greenleigh (Th). Silver Signal (py).
	E	Braidwood Pastures 1	Protection District.		
Ball, G Collins, J Dawson, J. C	Moruya Araluen Braidwood	Dunolly Hero (Cl). Glenardo (Py). Wargundy King (Cl).	Hatch, E. T McCaulev, R Sproxton, J	Bungendore Nellingen Nellingen	Major Nelson (Cl). Regent Palace (Th). Boy Prince (Dr).
		Cooma Pastures P	Protection District.		
Blomfields, H. M Eccleston, C. M Fergus, C. A Kennedy, C. W. P.		Trump (Py). David Wallace (Ci). Windstorm (Th). Wolsingham Brilliantshine (CI).	Norton, J. J Rose, C. M Russell, F. T Woodhouse, E. G.	Cooma Cooma Adaminaby Berridale	Scotland's Plaid (Cl). Kossi (Py). Penmark (Th). Bethdale Duke (Cl)
		Eden Pastures Pi	rotection District.		
Bright, W. E. Brunton, J. M Campbell, F. Carpenter, A. H Fantham, R. Fantham, S. Kameruka Estate	North Bega Bega Beinboka Eden Eden	Bo-Sha (Pv). Machine Mantle (Tr). Quarante (Ab). General William (Cl). Sonny Banker (Cl). Steel Wings (Py). Flower Grove Treasure (Cl).	Lord, W. J  Maples, F. G  Moffitt, O. C O'Grady, T. S Robinson, W. H Tett, V Underhull, T, H	Wolumla Bega Eurobodalla Megalla Cobargo Rocky Hall	General Gordon 2nd (Sr). Deeside Flashdale (Cl). Highlands Clifton (Sr). King-Boy (Th). Burnsfoot Pride (Dr). Young Dale (Cl). Silver Cash (Py).
		Goulburn Pastures	Protection District.		
Brown, F. E Campbell, O. C Churchill, G. and H. Churchill, G. and H.	Komingla Crookwell Pejar Pejar	Willow Lion (Cl). Forcett Silverslade (Cl). Rossendale (Py). Barelay Astrologer	Garradd, R Kelleher, F. G McKell, W. J Marshall, J Mitchell, B. L	Goulburn Tarago Goulburn Crookwell Goulburn	Lord Kingsdale (C1). Black Night (Pv). Derby Adonis (Tr). Black Prince (C1). Pine Vale Supreme
Cowling, A. L Cunningham, K. J. Fisher, L. H	Crookwell	Cl). Marquis (Py). Danny (Py). Glow On (Th).	Murphy, P. J Phelps, J. D	Goulburn Lake Bathurst	(Cl). Rouben (Pe). Foxlow Lord Rule (Pc).
		Kiama Pastures I	Protection District.		
Gibson, J. E Henry, E. W	Unanderra Bombaderry	Springfield Monarc h (Cl). Why-Wonder (Py).	Jackson, A Chittick, A. R	l'nanderra Kangaroo Valley	Dandy (Py). Azara (Abx).
		Picton Pastures F	Protection District.		
Brown, M Rose, J. H Walton, F. J	Tahmoor Picton Picton	Glenbower Star (Cl). Locarno Prince (Cl). Jonnie Jewel (Tr).	Watson, W. G Watson, W. G	Camden Camden	Camden Walla (Tr). Bold Voyage (Tr).
		Australian Capit	al Territory.		
Eddison, W. H	Canberra	Tigalau (Th).			
Bourke, P. M	Yass	Yass Pastures Page Genghis Khan (Ab).	Glover, T. and Sons	Bowning	Barclay Baronet (CI).
Bourke, P. M Coleman, H. M	Yass Grabben Gullen	Humedale Bruce (Cl).  Aralwood Sensation (Cl).	Glover, T. and Sons Grieves, C. R. & A. M. Lawton, H. J.	Bowning Cooks Hill Gunning	Mountain Hero (Cl). Widgle (Cl). Lee Creek Alexandra (Cl).
Glover, T. and Sons Glover, T. and Sons	Bowning	Barclay Hero (Cl). Gaine Cottingham (Th).	McAuliffe, T Reid, M. W. (Mrs.)	Yass Yass	Sampson (Cl). Traveller's Joy II
Glover, T. and Sons	Bowning	Allendale Macarthur (Cl).	Sainsbury, C	North Yass	(Py). Manowar (Ga).

## Approved Seed.

## February, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twenty-five for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied

regarding it to inquirers.

Wheat,
Bencubbin-Manager, Experiment Farm,
Trangic. (5s. 6d. bushel, f.o.r.)

G J. McLaren, Glenmore, Barmedman. Ford—Manager. Experiment Farm, Condobolin. (5s. 6d. bushel, f.o.r.)

G. J. McLaren, Glenmore, Barmedman. Gular—Manager, Experiment Farm, Trangie (5s. 6d. bushel, f.o.r.)

Koala—Manager, Experiment Farm, Condobolin. (5s. 6d. bushel, f.o.r)

Totadgin-Manager, Experiment Farm, Trangie. (5s. 6d. bushel, f.or.)

Oats.
Algerian—G. J. McLaren, Glemmore, Barmednian.
Onions

Hunter River: Early Brown—H. P. Richards.
\_ Sovereignton, Tenterfield.

Extra Early: Brown Globe—A. Yates & Co., 184-186 Sussex-street, Sydney.

Tweed Wonder—II. P. Richards, Sovereignton, Tenterfield.

Tweed Wonder-Rumseys Seeds Pty Ltd., 331 Church-street, Paramatta.

Beetroot.
Early Wonder—A. Yates & Co., 184 Sussex-street. Sydney.

Early Wonder—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta. Detroit Dark Red—A. Yates & Co., 184 Sussex

Detroit Dark Red-A. Yates & Co., 184 Sussex street, Sydney.

Improved Detroit Dark Red-Rumseys Seeds Pty. Ltd. 331 Church-street, Parramatta. Sweet Corn.
Golden Bantam—Principal, H.A. College, Richmond.

Broom Millet.

Manager, Experiment Farm, Bathurst.

Cabbage.
Copenhagen: Market—A. Yates & Co., 184-186
Sussex-street, Sydney.

Cauliflower.
Shorts—H. G. Crew, Nullenroo, Gresford.
Superior "K" (Selected Snowball)—Rumseys
Seeds Pty. Ltd., 331 Church-street, Parramatta.

Hawkesbury Solid White—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta. E. A. Sharp, 110 Gordon-avenue, Hamilton.

Phenomenal Maincrop—A. Yates & Co., 184
Sussex-street, Sydney.
Phenomenal Five Months—A. Yates & Co.,

184 Sussex-street, Sydney. E. A. Sharp, 110 Gordon-avenue, Hamilton.

Lettuce.

Imperial 847—Rumseys Seeds Pty. Ltd., 331 Church-street. Parramatta

Imperial 847—A. Yates & Co., 184-186 Sussexstreet, Sydney.

Imperial 615—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rhubarb.

Sydney Winter -Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Sorghum.

White African -- Manager, Experiment Farm, Grafton.

Saccaline—Principal, H.A. College, Richmond. Jones—Manager, Experiment Farm, Wollongbar. (3d. per lb.).

Tomatoes.

Bonny Best—Manager, Experiment Farm.
Bathurst (4s. oz. posted).
Marvana- Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta.

Break-o'-Day—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Australian Earliana—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Velvet Beans.
Manager, Experiment Farm, Grafton.

V Victor

#### Help Win the War!

Buy War Savings Certificates.

"For Victory."



Just remember the things you already know!

- that a tyre whose tread fills up with dirt will slip on soft ground and cut down your tractor's work;
   that a tyre that slips on wet ground is wasting power and time;
- —and, therefore, you know that you need a tyre with tread free from closed corners or pockets that pack up with dirt. You need a SELF-CLEANING tread that's able to dig in and pull, in all kinds of soil, a tread that can take a good "bite" even on wet ground—and pull ahead,

That's the tyre that will get the most work out of your tractor.

And that tyre is — the Goodyear Sure-Grip, pictured here.

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Stanley Street, South Brisbane



## Dreaded Tick Fever.

## All Dairying Districts Endangered.

THE success or failure of the Department's efforts to eradicate cattle tick from our north coast districts more vitally concerns every dairy farmer in New South Wales than is generally realised. Until the tick is exterminated in this State there is always the risk that disease-carrying ticks will filter through to the clean areas and thus expose the whole of the coastal areas and possibly the tablelands and slopes to the dread effects of tick fever.

In the last five years the number of outbreaks of tick fever in the quarantine areas of the north coast has progressively increased and the incidence has been so widespread within the tick-infested areas that further outbreaks can be anticipated in any part of that section of the State. It is most disconcerting to learn that recent outbreaks of the disease have occurred close to the southernmost quarantine boundary separating the tick-infested and clean areas.

Appealing for a wider appreciation of the very real danger of tick fever which now confronts the whole State, Mr. Max Henry, Chief of the Division of Animal Industry, said: "The number of known outbreaks of tick fever for the last five years 15 as follows:—9, 2, 13, 29, 52. It is extremely doubtful whether this list is complete, but this is not because of any negligence on the part of the Department of Agriculture Reports of cases or suspected cases are immediately followed up, but Departmental officials are not in a position to detect all cases. Farmers themselves may be unaware

that cases exist on their farms as, especially in young stock, very mild symptoms can easily escape notice.

#### Widespread Outbreaks.

"Ominous as are the figures of the numbers of outbreaks, a still worse feature is the extent of the area of country involved. Outbreaks of tick fever may now be anticipated in any tick-infested area, anywhere between the Queensland border and the southern boundary of the Tick Quarantine Areas, south of Grafton.

"The danger is increasing because there is with every outbreak the possibility that carriers will remain undetected. These carriers are liable to start fresh outbreaks elsewhere. Consequently every farmer in the tick quarantine areas is, for his own sake as well as that of the community generally, vitally interested in wiping out the tick.

#### A Very Real Danger.

"There is a further point which requires stressing. For a long while tick fever was held well away from 'clean,' that is, uninfected country. Tick fever is now almost on the edge of the quarantine areas. There-

MARKET YOU'R PIGS AT CORRECT WEIGHT AND AGE.

Porkers (4 to 5 months), 80 lb. live and 60 lb. dressed weight.

Baconers (6 to 7 months), 170 lb. live and 120 lb. dressed weight.

fore, if the tick filters through on the boundaries there is the chance that the ticks which filter through will be disease-carrying ticks. This fact greatly increases the danger to which the coastal farmers from Grafton to the Victorian border are exposed.

"Not only are the coastal farmers threatened. Cattle tick will not be likely to flourish in the tablelands and slopes, but it would only require one generation to hatch to bring about deaths from tick fever if disease-carrying ticks were involved. Naturally, the farmers most seriously endangered are those between Grafton and Newcastle.

#### Support Department's Dipping Campaign.

"For forty years the action of the Department has saved these farmers from this danger, but there appears to be very little recognition of this fact. How long this protection can be continued depends very greatly on the extent to which dipping is carried out in the tick quarantine areas.

"One further interesting point may be noted. A few years ago Kyogle was in danger of a widespread outbreak of tick fever. Both officials and alert farmers were agreed on this point. An eradication campaign was instituted which was not fully successful, but it did bring about such destruction of tick life that in the last two and a half years only one outbreak of tick fever occurred in the Kyogle district.

"The preservation of the cattle industry from tick fever depends on dipping and more dipping, and still more dipping, in the

Tick Quarantine Areas."

## The Value of Molasses

## When Making Silage.

L. JUDD. H.D.A., Senior Agricultural Instructor.

WHILE it is doubtful whether the addition of molasses to material used for silage making is necessary or economical where crops such as maize are grown under good conditions, in good soil, and converted into silage at the correct stage in accordance with approved methods, this treatment results in a more suitable product of higher feeding value when silage is made under less favourable conditions.

Leguminous crops, such as lucerne, which have been grown under conditions resulting in a flush, forced growth, and which carry excessive moisture, are, when used for ensilage in the absence of the molasses treatment, likely to develop an unfavourable fermentation, resulting in silage of low quality

and at times distinctly unpalatable. The addition of 40 to 50 lb. of molasses to each ton of material at the time of processing would

PIGS MUST BE PROPERLY FINISHED BUT NOT OVER-FAT.

Heavy pigs are salcable, but over-fat carcases are not desired.

prove a profitable investment and amply repay the trouble and expense incurred.

#### When Molasses is Beneficial.

Crops such as Japanese millet are at times difficult to handle if seasonal conditions are unfavourable and considerable tonnage and large areas of crop have to be converted into silage. The rapid ripening which takes place at times is liable to result in inferior silage. In such cases molasses should certiful handled to the material

tainly be added to the material.

All crops grown on what may be termed second-grade country in the county of Cumberland must be carefully watched when harvesting for silage. Generally they should be treated with molasses to secure the most satisfactory results.

Many seasons are experienced in which a flush and abnormal growth is in evidence during portion of the growing period of

HAVE A QUARANTINE STY
on the Farm
to assist in keeping the piggery
FREE FROM INTRODUCED
AILMENTS.

crops, to be abruptly followed by a premature ripening. Such crops, if carefully examined, will be found to be pithy and to lack succulence; to be more mature and in drier condition than their outward appearance would indicate. When silage making under such conditions, the adoption of the molasses treatment should be regarded as normal practice.

#### How to Use Molasses.

As a general guide it may be stated the quantity of molasses used depends upon the nature of the crop, the protein content and its succulence. Richness in protein, coupled with low carbohydrate content, requires a greater quantity of molasses than where the reverse is the case. Roughly the range of the quantity of molasses to be added is from 20 to 50 lb. to every ton of material being treated.

The molasses should be diluted with water to a suitable consistency; approximately 20 lb. of molasses added to 10 gallons of water will be found to give a suitable solution. The solution is sprayed on to the material in the pit, or in the silo, as the case may be. A watering can with fine rose will be found quite suitable for the purpose. A practice adopted by some farmers is to feed the molasses solution into the feed box of the silage cutter at a point of entry close to the knives, the discharge of the solution being controlled so that the requisite amount of solution is added.

## New Chief Dairy Instructor Appointed.

MR. GEORGE McGILLIVRAY has been appointed Chief Dairy Instructor of this Department He obtained the Diploma in Agriculture, Hawkesbury Agricultural College, 1912, and the Diploma in Dairying, 1913. He was dux at the final examinations in Dairying. As a student at Hawkesbury Agricultural College he gained on two successive occasions by ballot of the student body the award for the best all-round student on the basis of academic ability, leadership, service to the college and sporting activities.

In October, 1913, he was appointed Assistant Dairy Instructor at Hawkesbury Agricultural College. He enlisted for active service in August, 1914, and served at Gallipoli, in Egypt and in Palestine. He received a commission in the 6th Light Horse Regiment. Prior to returning to Australia he spent some months at the East of Scotland Agricultural College, Edinburgh, in a study of dairy bacteriology.

He resumed duty with the Department in 1920. In 1921 he had practical factory experience in the Manning River district.

In 1922 he was appointed Senior Dairy Instructor at Hawkesbury Agricultural College, where he remained for seven years. During that period his name became prominent among Jersey breeders and dairy farmers generally, especially on feeds and feeding problems.

In 1928 he was appointed Manager, Wollongbar Experiment Farm, and remained in that position seven years. During that period the farm became a great educational centre in the Richmond River dairying district. He was elected first president of the North Coast National Agricultural Society, and is now Patron and Life Member of the society.

In December, 1936, he was appointed Assistant Herdmaster and is recognised as a competent judge of all breeds of dairy stock and in that capacity has adjudicated in district shows throughout this State and other States. He has had extensive experience in connection with various aspects of the dairying industry for more than twenty years.

## Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry. Date.	Owner and Address.	Number Tested.	Expiry Date.
		1942.			1942.
Wallah Pastoral Co., "Wallah," Narrabri	84	4 Feb.	W. Turnbull. "Riverview," Muswellbrook Peel River Land and Mineral Co., Tamworth	66	5 Aug
L. E. Liggins, "St. Leger Dairy," Kuring-gai	4.8	6	(Beef Shorthorns)	16	8,,
Chase Road, Turramurra North  Forster and Sons, Abington, Armidale (Jerseys)	45 58	8 ,,	W. Williams, Dunreath, Inverell	32	29 ,,
I. Toohey, "Mandemar," Berrima	56	š ,,	C. I. Fairbairn, Woomargama	210	26 Sep1
L. Forster, Abington, Armidale (Aberdeen			F. and C. Ryall, 5 Western Avenue, West	1	
Angus)	182	8,,	Wollongong	57	I Oct.
Barnardo Farm School, Mowbray Park	51	10 .,	W. J. Stephenson, "Hill View," Fig Tree	23	IO
. S. Simpson, Gulargambone	98	13 "	W. C. Wyatt, Sherwood Road, Merrylands Ehsman Bros., Inverell	29 25	12 ,,
the William Thompson Masonic School,		14 ,,	Hawkesbury Agricultural College, Richmond	4.5	17 ,,
Baulkham Hills	169	'	(Jerseys)	128	18 .,
fiss N. C. Brenan, Arrankamp, Bowrai	23	15 ,,	Segenhoe Estates, Scone	65	31 ,,
Wilton, Bligh Street, Muswellbrook	93	19 "	Lunacy Department, Gladesville Mental	-	-
mu Plains Prison Farm	110	19 ,,	Hospital	22	14 Nov
epartment of Education, Brush Farm, East-	1		Bathurst Experiment Farm (Ayrshires)	21	18 ,,
wood	7	20 ,,	W. W. Martin, "Narooma," Urana Road,		
C. O'Dea, Perry Street, Dundas	23	20 ,,	Wagga	68	29 ,,
M. Edwards, Uralla N. Coote, Auburn Vale Road, Inverell	5	22 ,,	A. G. Wilson, Exeter (Jerseys)	00	29
. Bast, Gum Flat Road, Inverell	30 41	22 ,,	Lunacy Department, Parramatta Mental	1	1943.
t. Ignatius College, Hunter's Hill	21	27 ,,	Hospital	31	6 Feb
V. Boland, "Seaton," Inverell	14	28 ,,	The Sydney Church of England Grammar	-	
unacy Department, Callan Park Mental		•	School, Moss Vale	55	6 ,,
Hospital	28	29 ,,	Tudor House School, Moss Vale	17	6 ,,
Imond Bros., Morisset	56	30 ,,	Koyong School, Moss Vale	2	6 ,,
epartment of Education, Yanco Agricultural	[	- M	New England Girls' Grammar School, Armidale	25	6 ,,
High School	50	ı Mar. ı	A. E. Stace, Taylor Street, Armidale New England University College, Armidale	31	ı Mar
Riverina Welfare Farm, Yanco rangie Experiment Farm, Trangie	80 94	_ ''	Lunacy Department, Morisset Mental Hospital	80	25 ,,
Berry Training Farm, Berry	188	7 "	R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	3 Apr
Vagga Experiment Farm (Jerseys)	50	16 ,,	Liverpool State Hospital and Home	102	10 ,,
E. D. Hordern, Cabramatta (A.I.S.)	97	29 ,,	H. F. White, Bald Blair, Guyra (Aberdeen	ĺ	
t. Michael's Orphanage, Baulkham Hills	21	31 "	Angus)	137	26 ,,
arm Home for Boys, Mittagong	56	18 April.	F. C. Harcombe, Hillcrest Farm, Warialda		
. H. Newman, "Bunnigalore," Belanglo, via			Road, Inverell	32	15 May
Sutton Forest	19	15 May.	Sir F. H. Stewart, Dundas	0	30
arrer Memorial Agricultural High School, Nemingha	27	17	Cowra Experiment Farm	41	27 Jun
Brownlaw, Gol Gol	34	26 ,,	Kahlua Pastoral Co., "Kahlua," Coolac	314	10 July
ew England Experiment Farm, Glen Innes	34	,,	W. Budden, "Hunter View," Kayuga Road,	(	
(Terseys)	64	27 ,,	Muswellbrook	18	5 Aug
idcombe State Hospital and Home	146	13 June	Navua Ltd., Grose Wold, via Richmond	. 1	
. L. Killen, " Pine Park," Mumbil	201	20 ,,	(Jerseys)	113	4 Sept
unacy Department, Rydalmere Mental			Australian Missionary College, Cooranbong	113	8 ,,
Hospital	48	27 ,,	Department of Education, Gosford Farm	40	20
'. J. Wilks. "Oaks Farm," Muswellbrook V. S. Grant, Braidwood	45	28 ,, 14 July.	A. L. Logue, "Thornbro," Muswellbrook	40 46	29 ,, 13 Oct.
. Hannaford	24	14 July.	Lunacy Department, Kenmore Mental Hospital	108	5 Nov
t. Vincent's Boys' Home, Westmead	10	19 ,	Wolfongbar Experiment Farm	112	4 Dec
Juristone Agricultural High School, Glenfield	33	26 ,,	State Penitentiary, Long Bay	10	9 ,,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bonibala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry

### Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 364, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates

should be notified at once.	1942.		1942.
Mudgee	Feb. 24, 25, 26.	Cooma (W. G. Metcalfe)	Mar. 18, 19.
Dorrigo (J. H. Skeoch)	,, 25, 26.	Coonabarabran	,, 19, 20.
Tumut (T. E. Wilkinson)	Mar. 3, 4.	Baradine	,, 24.
Yeoval (J. A. Stapleton)	,, 4.	Grafton (L. C. Lawson)	Apr. 22-25.
Gulgong	., 4, 5.	Peak Hill (L. H. Roache)	July 28, 29.
Dunedoo	,, 9,	Condobolin (N. J. Hanlen)	Aug. 4, 5.
Tumbarumba (I., G. Roth)	,, 11, 12.	Bogan Gate (J. T. aBeckett)	., 8.
Mendooran	,, 12,	Trundle (W. A. Long)	,, 11, 12.
Queanbeyan (H. C. Deane)	,, 13, 14.	Tuliamore (W. J. Colville)	,, 19.
Cessnock (Bill Brown)	,, 13, 14.	Parkes (L. S. Seaborn)	,, 24, 25, 26.
Binnaway	16.	Forbes (W. D. Roberts)	Sept. t. 2.

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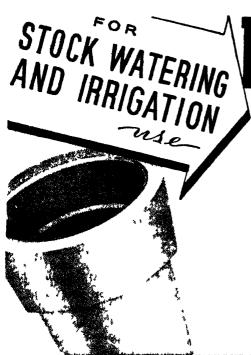


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"Keeps on Keeping on."



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## Green Manuring in Coastal Districts.

R. J. BENTON, Special Fruit Instructor, and E. C. LEVITT, Fruit Instructor.

WARTIME shortage of nitrogenous and phosphatic fertilisers has created a problem for the citrus grower. To get the best results with the smaller quantities, the phosphatic fertiliser available should be used to promote the growth of green manure crops, and nitrogenous fertiliser applied direct to the trees when the green manure crops are turned under. In addition conditions must be created in the soil which will free any plant foods that may be locked up and not available.

In coastal soils these released nutrients may be leached out should heavy falls of rain occur, and they should be stored or conserved in a cover crop. Liming is very helpful in promoting the better growth of leguminous cover crops, and the recommended procedure is to apply ½ ton per acre of agricultural lime—dolomite lime in light sandy soil—at once, and to sow a legume at the end of February.

The decaying of the cover crop stimulates soil organisms, and increases acidity, factors most helpful in releasing plant foods for the use of trees.

Growers on areas where, in normal seasons, green manure crops are grown, should therefore make full use of this means of increasing soil fertility.

The increased fertility that results from the growing of green manure crops is largely the result of the improvement in soil structure and water holding capacity that follows. Where legumes are used, some addition of nitrogen results, but seldom sufficient to supply the fruit trees with all they require.

The improvement in soil structure is largely attributable to the root development of the crop.

A penetrating root system will enter the zone below plough depth and when it decays, leave the soil in a friable condition. This permits moisture and air to enter more freely. Aeration of the soil in the tree root zone by the use of implements is out of the question, but the green manure crop can effect it without damage to the tree roots. Land clean cultivated over long periods tends to become harsh and compacted. A cultivation "pan" may form through which moisture penetrates with difficulty.

A common belief that green manures can take the place of fertilisers is a mistaken one. Green manure crops should be grown in addition to the fertiliser programme, not instead of it.

#### Legumes Generally Preferred.

Because they make less demand on the soil nitrogen than do other crops, legumes are preferred as a green manure crop, but all crops, even weeds, have value. Some weeds are quite useful because of their deep-rooting habits, and are to be preferred to plants with poor, shallow-rooting habits.

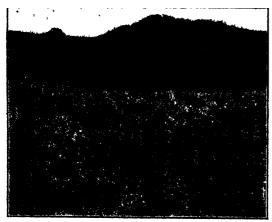
Many crop plants and mixtures have been found useful on coastal orchards. The most

popular crops and combinations are included in the following list:--

CROPS SUITED TO COASTAL CONDITIONS.

Crop.	Seeding rate per acre.
(a) Legumes—	•
N.Z. Blue Lupins	11/4 to 11/2 bushels
Grey Field Peas .	I to 11/2 bushels.
Purple Vetch	20 to 25 lb.
Subterranean Clover	r 6-8 1b.
(b) Non-Legumes-	
Mustard (White) .	8 to 10 lb.
Mustard (Black)	8 to 10 lb.
Rape	8 to 10 lb.
Barley	11 bushels

Rye ..... 1¼ bushels



A Crop of New Zealand Blue Lupins and Purple Vetch, Gosford District.

(1)	Mixtures— Purple Vetch 10 lb. Wheat 1 bushel
	Purple Vetch to lb. Rye 1 bushel
	Grey Field Peas

The seeding rates indicated are for land on which tree size is small. Reduced quantities may be used where trees are of medium to large size. Generally, heavy sowing rates result in better crops because weed competition has less effect on the young plants.

Subterranean clover is being used to a limited extent in coastal orchards. Its main drawback is that the greatest growth is made in the spring, and control of soil moisture by irrigation would probably be necessary in most seasons if drying out is to be avoided. Carefully managed and in high rainfall localities this crop promises to become a useful addition to our green manure list.

Crops such as cowpeas cannot be generally recommended for planting in orchards, because they are summer growing and would compete with the trees for moisture at a time when their water requirements are greatest. Tick beans are seldom satisfactory in the coastal belt, dry spells retarding the growth of this moisture-loving crop.

#### Manuring the Green Crop.

Green manure crops should be given some manure or fertiliser dressing even if the crop consists of volunteer weeds. Maximum growth is thus obtained and undue competition with the trees for plant food is avoided.

In the more fertile soils I to 1½ cwt. superphosphate per acre will be sufficient. In all other soils nitrogen must also be added. Sulphate of ammonia is one convenient form in which nitrogen may be supplied, and amounts of from 1½ to 3 cwts. per acre, according to the soil type, in addition to the superphosphate would be required. Other fertilisers supplying nitrogen may be substituted for sulphate of ammonia if desired, with allowances made in the quantity for any difference in nitrogen content. Four times the quantity of a blood and bone fertiliser, for instance, containing 5 per cent. nitrogen would have to be used to equal a fertiliser containing 20 per cent., such as sulphate of ammonia.

#### Planting.

Late February or early March has proved to be the most suitable time to plant green crops. Mustards, however, may be planted as late as early April.

A little extra care given to preparing the seed bed is repaid by a more even and rapid germination of the seed. Weeds are less likely to give trouble if the young plants grow away quickly.

The seed may be sown either broadcast or in drills. The latter method offers advantages in weed control in the early stages, but broadcasting is usually found both satisfactory and convenient. Subterranean clover, rape and other small seeds are more evenly sown if mixed with the superphosphate. If this is done, sowing should proceed without delay, otherwise germination may be adversely affected.

#### Turning In.

In the majority of coastal orchards the green crop should be turned under not later than July. Risk of drying out the soil is very great after this date, and delay is only permissible where irrigation can be carried out if necessary. If the plough is used, it may be necessary to commence in June to allow the crop to decay sufficiently to permit cross-ploughing in July.

A nitrogenous fertiliser applied at the time of turning in is good practice, because the decay progress ties up temporarily much of the available soil nitrogen, with the result that the trees are starved—often at a critical period for the crop. By the addition of a nitrogenous manure this position is avoided.

## The Drying of Peaches.

J. A. BALLANTYNE, Special Fruit Instructor.

FRUIT for drying should be thoroughly matured -when in suitable condition for cating it is in condition for drying. Under no circumstances should the fruit be prepared for drying before this eating ripe stage has been reached. If the fruit be partially green the dried product will be unattractive, and lack colour and flavour. Overripeness is also to be avoided; the fruit then becomes misshapen and darkens, and is known as "slabs," which have little commercial value.

It is necessary to pick the fruit prior to the soft ripe condition having been reached, otherwise considerable loss will probably occur. At the same time, great care must be taken to avoid early picking. The fruit should be picked mature, and the desired ripe condition reached by allowing the fruit to ripen in the boxes for a few days.

#### Pitting.

When sufficiently mature, pitting, or removal of the seed from the fruit, is carried out. Cutting is done by hand. Although cutting and pitting is the largest item in the costs of drying of peaches, it must not be slummed in any way The fruit should be cut right found the line of the suture, so that two equal halves result, with cleanly-cut, smooth edges.

#### Drying Trays.

The pitted fruit is placed, cut surface uppermost, on wooden drying trays and taken to the sulphur house.

The drying trays vary slightly in size, but in practice one or two sizes have been found particularly convenient. When using an evaporator, the size of the trav, of course, is determined by the size and design of the drying chamber, but for sun drying the 3 feet by 2 feet tray that was 50 widely used has been somewhat superseded by trays of larger size. Two useful sizes are the 4 feet by 3 feet and 6 feet by 3 feet.

#### Sulphuring.

Satisfactory designs of sulphur-houses range from a movable box holding twelve to fifteen trays of fruit to a series of houses along a tramline, each holding a fairly large quantity of fruit.

When the travs are in the sulphur chamber, it is closed and the sulphur ignited. It is most satisfactory to have the sulphur spread over a fairly large surface, and as burning sulphur is a rather powerful corrosive it is desirable that the container should be, say, 1-16th inch in thickness; an old frying-pan or some similar metal container answers the purpose well.

Some kindling, such as dry grass, a piece of paper or a piece of hessian, should be placed under the sulphur as tinder to encourage the burning of the sulphur, which is liable to "go out" unless such precautions are taken. When the tinder is lighted, a little of the sulphur should be sprinkled over the burning section, and the pan not placed in position until the edge of the main body of sulphur has begun to melt and assumes an appearance somewhat similar to treacle.

As sulphur will not burn without a supply of air, it is essential that a vent be provided as near to the sulphur as possible, and at or near ground level.

Generally speaking, however, it is most satisfactory to have the sulphur pot in a pit outside the sulphur chamber, in which case the pit should be covered with a sheet of iron, under which a trench is cut in order to provide sufficient draught to enable the sulphur fumes to reach the fruit. To ensure the free movement of the fumes from the pit into and through the chamber, it is necessary to provide the chamber with vents. For this purpose auger holes of 34 to 1 inch in diameter at the top of the house, and at the end farthest from the burning sulphur, are satisfactory, though it is preferable that vents be provided at both ends, those on the windward side being closed (corked) during operations.

#### Sulphur Dioxide Content.

Since the sulphur dioxide (SO<sub>2</sub>) content of dried peaches comes within the Health and Pure Food Acts of the various States and countries to which our dried peaches are sold, it is important that only sufficient exposure he given to fix properly the colour of the dried product. The properly the colour of the dried product. legal tolerance is 14 grains of sulphur dioxide per pound of dried fruit, and in order to ensure that the fruit will keep without deterioration of the colour in the moist packs at present being put up by the packers it is necessary to keep as close as possible to the limit prescribed.

It has been amply shown that dried fruits in sturage give off a proportion of their SO<sub>2</sub> content, and as the moisture content of the sample rises the rate at which the dissipation of the SO<sub>2</sub> takes place is increased, so that for the moist packs to remain in good condition over fairly long periods of storage it will be realised that fruit may easily

be under-sulphured.

Generally, the period of exposure to sulphur fumes in the case of peaches is in the vicinity of six hours, burning sulphur at the rate of about 8 lb to the ton of fresh fruit. It must be understood that the fruit must be subjected to the fumes for the whole period, so that should the box not be airtight and the sulphur burn out before the period has clapsed, it will be necessary to recharge the sulphur box in order to finish the period of sulphuring.

There are a number of guides as to when fruit is ready to be removed from the sulphur chamber, but the most reliable test is to take the fruit between the thumb and forefinger, and if the skin of the fruit readily slips from the pulp and the fruit has an even cooked appearance, then it may

safely be removed.

#### Shade or Sun Drying.

Although a diversity of opinion exists as to the relative merits of shade drying and sun drying the best samples are generally produced by about two-thirds drying in the sun and finishing the drying in the stack.

Often the fruit becomes quite "chippy," due to overdrying, and cases have been noticed where growers, realising that weight is being lost, have used the watering can or similar means to moisten the fruit when placing it in the sweat box. The results are generally disastrous; on occasions as much as 80 per cent. has had to be rejected owing to discolouration due to too much water or its uneven distribution. The difference between

"dry" and "overdry" fruit is generally only about 2 to 3 per cent. of the total weight, and not 20 to 30 per cent. as is commonly believed,

It is essential that fruit on the drying trays should at all stages be protected from rain and dust; rain will cause the fruit to go black in colour, whilst dust, which is expensive to remove, makes the fruit dirty and unpalatable.

## Drying Apples.

ALL mid-season and late apples may be used for

drying. The greatest quantity of Australian dried apples is produced in Tasmania.

The fruit is peeled, cored and sliced into rings by machinery. It is then exposed to sulphur fumes for about thirty minutes, using sulphur at the rate of 1 lb. to 200 cubic feet of space, and then dried in an evaporator. In the factory sulphuring is going on continuously, and there is very little period between the time the fruit is cut and when it enters the sulphur chamber.

In doing small lots there may be too long a wait before sufficient fruit is cut to sulphur; in that case the cut fruit should be placed in a very weak solution of salt and water—just suffi-cient salt to enable it to be tasted. The fruit should not be left in the salt solution more than 15 to 20 minutes; this dip will prevent the fruit turning brown before it is sulphured.

In Tasmania kiln evaporators are chiefly used, the fruit being placed direct on slatted floors above a hot air chamber. The fruit is spread on these floors to a depth of about 6 inches. The kiln evaporator is considered to be the

cheaper method of drying apples.

Apples can be dried in tray evaporators, the prepared fruit being spread on the trays to a depth of about 2 inches. In hot dry climates, limited quantities of apples can be dried in the sun on trays. If the sun is very hot, the trays should be stacked in such a manner that the air will pass readily through the trays over the fruit, as if exposed direct to the sun the fruit will dry a dark colour. The preparation of apples for sun

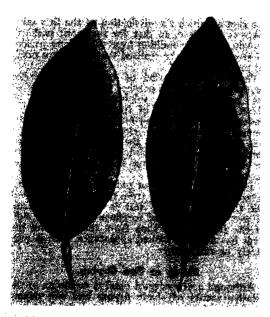
drying is similar to that for kiln or evaporator drying. Sun drying of fruit should only be attempted in dry climates.

In many cooler apple districts, the climatic conditions are not suitable for sun drying, for when the mid-season and late apples have reached a suitable condition for drying, there is not

sufficient heat.

### Manganese and Zinc Deficiencies in Coastal Citrus Trees.

R. J. BENTON, Special Fruit Instructor.



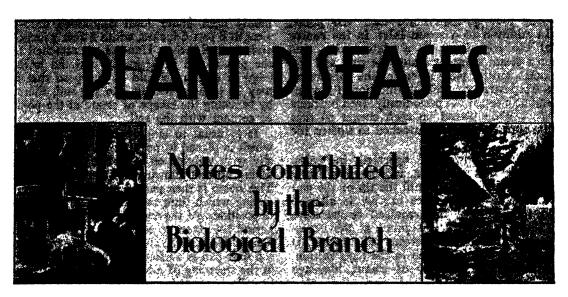
Valencia Orange Leaves Showing Mottle Condition Due to Manganese Deficiency.

For some years in central coastal areas, occasional citrus trees have shown a mottled leaf condition the usual symptoms of which are irregular areas of pale-green to yellow colour in between the veins which remain green for a longer time. This form of mottling is indicative of lack of manganese, and very similar symptoms are shown in the absence of sufficient zinc. In the latter case, however, leaf size is significant, for if the mottling is due to zinc deficiency, there is a pronounced tendency towards production of small leaves which are rather more pointed and narrow than normal leaves.

Generally, in coastal areas, the symptoms of these deficiencies are not severe, and may be confined to occasional leaves or small branches on odd trees. Sometimes, however, trees may be affected more completely, in which case production may be more or less affected, in keeping with the acuteness of the deficiency.

Though generally aged trees are not severely affected, it is not uncommon for trees which either have been severely pruned or reheaded for budding over, to exhibit severe symptoms of these deficiency troubles. Response of subsequent growth in such cases is very disappointing and satisfactory rejuvenation does not result until the conditions affecting the supply of manganese and zinc are improved. Though these deficiencies are distinct, they appear very frequently in com-bination in coastal districts.

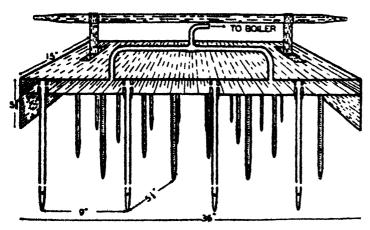
(Continued on page 94.)



## Steam Sterilisation of Soils.

STERILISATION by steam to rid soil of eelworms, fungi, insects and weed seeds is practised by numerous growers of glass-house tomatoes. The inverted-pan method is widely used, but the spike harrow process is gaining in favour amongst tomato glass-house growers in the Sydney Metropolitan Area. Other methods of steaming soil which are used overseas, but which are not widely used in this country, include the buried perforated pipe system and the buried drain tile system.

In all cases steam is supplied from a boiler which should preferably be of the movable type, and of sufficient capacity to supply the required quantity of steam for the size of outfit used. Most local growers who use steam for soil sterilisation have adapted second-hand "Sentinel" boilers for the purpose.



#### The Spike-Harrow System.

The accompanying figure shows the type of spike harrow which is now coming more and more into use amongst local tomato glasshouse growers. The tines are attached to the lower surface of a combined inverted pan and steam chambers. The type most commonly used here consists of a pan 3 feet

9 inches by 2 feet 9 inches, made from 12-gauge galvanised iron, reinforced on top and bottom. The steam chamber is 21 inches deep

Spike Harrow for Steam Sterilisation [Drawing by G. G. Taylor.]

and the tines, 12 inches long and # inch in diameter, are arranged in seven rows of five tines. Each tine is pointed and perforated with

with four  $^3_{32}$  inch holes near the point. In addition to a steam inlet in the centre of the top, there is a plate which acts as a steam spreader inside the pan, and a 6 inch diameter plate in one of the corners on the top surface so that the interior of the pan can be cleaned out periodically. Iron brackets are usually placed on each corner so that the apparatus can be attached to timber for carriage.

Spike harrows are operated in pairs. Steam is first turned on, and the tines firmly pressed into the soil until the tip of the pan is buried. Each spike harrow is allowed to remain until the required temperature (180 deg. Fahr.) is secured at the necessary depth, and with steam still flowing, is withdrawn and inserted in the next section. By retaining the flow of steam, blockage of the holes in the times is prevented, entry

monly used under local conditions are:—Length 8 feet 6 inches, width 4 feet 3 inches and depth 8 inches. Handles are attached to the pan to aid in lifting it, and the lower edge of the pan should be sharp so that it may be pressed readily into the soil, thereby reducing the escape of steam at the point of contact with the soil.

It is usual to employ two pans, one of which is placed in position on the soil, usually with weights on top of it to prevent it lifting up and allowing the steam to escape. The steam is then passed in for 20 minutes, during which time the second pan is placed in position. At the end of the first 20-minute period the steam is connected to the second pan, and whilst the steam is passing into this the first pan is shifted to a new area. Thus, in the steaming of a house, the steam is continually passing into one of the two pans.

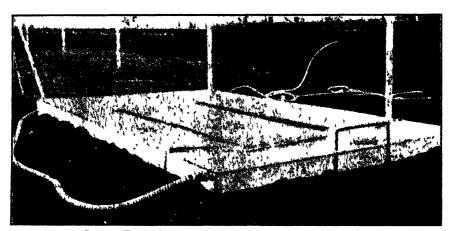


Fig. 1.—Type of Inverted Pan Used for Steaming the Soil.

[ After Chupp.

into the soil facilitated and condensation of steam avoided. After withdrawal of the harrow, the soil is preferably covered with a tarpaulin or sacking for half an hour.

Disinfection is secured to a depth of 10 to 12 inches in from 7 to 10 minutes with a boiler pressure of 75 to 100 lb. Soil should be well worked and of moderate moisture content before steaming.

#### The Steam Pan System.

In the steam pan system the steam is forced into an inverted pan made of moderately heavy gauge galvanised iron, reinforced with angle iron; or durable lightweight timber may be used in its construction. The dimensions of the pan most com-

#### Buried Drain-Tile System.

In the buried tile system, 3 or 4-inch drain tiles are laid in rows which are connected by a series of cross pipes and close-fitting nipples which feed several lines of tiles at a time. The drain tiles which are loosely fitted end to end, may be permanently buried in the soil or may be dug up after the steaming and shifted to a new position.

#### Comparison of Different Systems.

In the United States, the permanentlyburied drain tile system is considered the most efficient and, over a long period of years, probably the least expensive. Because of the high initial costs of this system,

#### FEBRUARY 1, 1942.]

however, growers in this country have concentrated on the pan and spike harrow systems. As indicated earlier, the spike harrow system is rapidly gaining in favour under local conditions, due to the lower operating costs, the saving in fuel and labour compensating for the fact that the initial cost of a pair of steam harrows (about £24) is somewhat greater than that of a pair of pans (£14). The saving in fuel and labour may be illustrated by the fact that, with a "Sentinel" steam boiler, it takes about 16 hours to treat a standard house (96 feet x 15 feet) using the pan system, but only about 10 hours to treat the same area with a pair

of spike harrows. Moreover, whilst three men (or two men and a boy) are needed to work a pan system, two men can usually operate the steam harrow system. It may be mentioned that in each case one man's time is wholly taken up in attending to the boiler—water and fuel supply and attention to pressure gauges, &c.

Eelworms, insects and most fungi are killed by exposure to 140 deg. Fahr., and most weed seeds at 200 deg. Fahr. It is always advisable to check soil temperatures with a reliable thermometer, and following treatment, the soil should remain for two to three weeks before planting takes place.

## Brown Spot of Passion Fruit.

Brown Spot, caused by the fungus Alternaria passiflorac, may at times, be very destructive in commercial plantations. Development of the disease is favoured by warm, humid weather, although it may be in evidence on vines throughout the year.

Most growers are familiar with the common symptoms of the disease. The spots on the fruit are at first circular in outline and light-brown in colour. The diseased areas eventually increase in size, and in some cases the whole fruit is affected. The

Passion Vine Leaf Showing Brown Spot.

skin of the fruit in the diseased portions becomes wrinkled, and is readily broken under light pressure, and the fruit pulp loses its desirable flavour.



Passion-fruit Affected with Brown Spot.

The spots on the leaves also vary in size according to the degree of infection, but generally range up to ½ inch in diameter. At first they are brown in colour, but later develop pale or straw-coloured central portions.

Very serious effects may follow development of diseased areas on shoots or runners. Elongated, brownish-coloured spots may be observed, generally in the region of the point of attachment of a leaf to the runner. As the spot increases in size it may encircle and cause death of the shoot. The leaves above the diseased region become yellowish and fall from the vine. Extensive development of the disease may result in almost complete defoliation of the vine.

#### Control Measures.

Effective control of the disease can be secured only when protective measures are applied in advance of the disease. Satisfactory results on heavily foliaged vines cannot be obtained unless at an earlier stage, protective sprays have been applied to the vines. Bordeaux mixture is the most useful spray in this connection. Young vines may escape serious infection, but protective measures become essential before there is any density in the foliage.

Vines should be pruned at least once a year, and this operation should be followed with applications of Bordeaux mixture, 6-4-50, at approximately monthly intervals during spring and summer, and at two-monthly intervals during the cooler months

of the year.

It is essential that the Bordeaux should be present on the inner portions of the vines if protection is to be provided against the disease.

Some growers have found that it is practicable to arrange early removal and destruction of diseased leaves and runners, and to cut out diseased portions on branches and runners. Such measures, however, can be considered as of secondary value, and may be utilised only where lack of water supplies and the hilly nature of the planted area make impossible the utilisation of a spraying programme.

#### New Plant Disease.

DURING December, 1941, the following disease was recorded for the first time in New South Wales:—

Powdery Mildew of Photinia serrulata, caused by Oidium sp.

## Breed Plain-bodied Sheep.

(Continued from page 62.)

#### Breed Out Faulty Conformation.

Selective breeding against inherent predisposition to blowfly strike must be regarded as a long-range policy, but by using plain breeched rams from plain studs, or, better still, using progeny tested rams, the time in which definite improvement will be effected will be considerably shortened.

Whereas wrinkliness of the breech may be overcome in the individual animal by operative procedure, it is not possible to reduce the predisposition of the sheep to body strike or to improve the constitution of the animal or the quality of the wool by artificial means.

It is recommended, therefore, that apart from any surgical measures which might be adopted to render the sheep less predisposed to fly strike, the policy of selective breeding towards a type of sheep of good conformation, free from breech wrinkles and carrying dense high quality wool, should be carried out.

## Fruit Growing.

(Continued from page 90.)

In spraying trials, conducted last autumn (March, 1941) at Mangrove Mountain, on Valencias, and in August at Moorland, on mandarins, the trees showed marked improvement in growth made three months after the spray applications.

The combination spray applied to trees showing both zinc and manganese deficiency symptoms was 5 lb. manganese sulphate, 5 lb. zinc sulphate, 5 lb. hydrated lime and 100 gallons water. Half a gallon of white oil was added to the spray applied at Mangrove Mountain, but no oil was used in the trial at Moorland.

The most suitable time to apply treatments by spraying is at the time of commencement of a growth cycle—about early March or September.

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## AN ANNOUNCEMENT BY THE DEPARTMENT OF RAILWAYS.

READERS of the "Agricultural Gazette" will understand that, in existing circumstances, it is impossible to make any definite pronouncement regarding train services.

The best that can be done is to give an assurance that the Department will continue to provide both passenger and goods transportation in accordance with the facilities available for those purposes.

On their part the public are asked to accept, readily and cheerfully, any restrictions on train travel and the carriage of merchandise which it may be necessary to impose.

In thus co-operating with the Department of Railways during a period of intense activity, railway users will make a valuable contribution to the common cause.

> S. R. NICHOLAS. Acting Secretary for Railways.



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FLEASE MENTION THIS JOURNAL.



Filipicy). When bean seed was sown in previously sterilised soil to which chopped up diseased plants were added immediately before sowing the seed, symptoms similar to those on plants collected in the field developed on the resulting plants. Eclworms were found associated with all stem

lesions occurring on these plants

#### Review of Literature.

In New South Wales the stem nematode (Anguillulina dipsaci) had previously been recorded on the following hosts:—Narcissus, daffodil, lucerne, two species of medic (Medicago denticulata and M. minima), prairie grass (Bromus uniolaides), phlox and hyacinth. The disease as it occurs on lucerne in New South Wales has been described by Edwards (1)

A. dipsaci has a wide host range, Goodey (1) in 1933 listing 213 species attacked, whilst Steiner and Buhrer (6) a year earlier listed 195 plants as hosts of this eelworm. In the host lists published by Goodey (2, 2) and Steiner and Buhrer (6) Phascolus vulyaris is included as one of the hosts of A. dipsaci, but there is no description of the symptoms or reference to the distribution or importance of the disease on P. vulgaris in these publications, Apparently, in 1932, when the host list of Steiner and Buhrer (6) was pub

lished, A. dipsaci had not been recorded as attacking P. vulgaris in continental U.S.A. In the host list published by Goodey (2) in 1929, Phaseolus vulgaris (kidney bean) is listed as a host with J. Ritrema Bos (1912) as the original authority. The writer has been unable to secure, in Australia, a copy of this paper by Bos and no other references to the occurrence of A dipsaci on P vulgaris have so far been found. It is quite apparent, however, that the disease described in the present paper is not a well-known disease of French, kidney, haricot, butter (wax) and other beans of the botanical species Phaseolus vulgaris.

Sterner (b) recorded root knot eelworm (Heterodera marion (Cornu) Goodey) larvae entering and attacking the leaves and stems of beans, but this was apparently an exceptional case where there was a very heavy infestation of root knot larvae in the soil. In the present instance there were no symptoms of root knot on the roots of affected bean plants or on tomatoor marrow roots in the vicinity of diseased beans.

#### Distribution of the Disease.

Field inspections and surveys for the presence of the disease were made in September and October, 1941, and, as far as could be determined.

the disease appeared to be confined to three farms at Matcham. In all three cases the disease was confined to certain sections of these farms. The affected areas on two of the farms immediately adjoined each other, whilst the third area was less than a mile away on the other side of a valley. The total area of beans inspected showing symptoms of the stem eclworm disease was estimated at about five acres However, it is considered that an additional ten to twenty acres of adjacent land sown to crops other than beans or under no crop at the time of inspection were also probably infested with the stem eelworm. One grower claims to have seen the disease for at least twenty years, another grower has had it on his farm for ten to twelve years, whilst the third grower stated that he had first observed it about four years earlier. All three growers stated that the disease occurs every year in beans sown in intested land for the spring crop (sowings made June to August), but that the disease does not occur in the autumn crop (sowings usually made in March.) One grower stated that when first observed the disease was confined to a patch of a few square yards, but that in subsequent years the area of infected plants gradually extended. In other parts of the Gosford district where winter- and spring-sown beans are the main commercial crop-at Berkeley Vale, Tumbi Umbi, Wamberal, Terrigal and Kincumber-the disease has not yet been observed.

#### Symptoms.

As soon as the seedling emerges above ground symptoms are apparent on the hypocotyl (that portion of the stem below the cotyledons or seed leaves) as swellings and as reddish-brown cracks (Fig. 1). The swellings are somewhat elongated in the direction of the stem and are usually about a quarter of an inch in length. When cut open, these swellings reveal a slight brownish discolouration of the bean tissue. Later the swellings become a reddish-brown colour and crack open On mature plants the disease may be found extending further up the plant and shows as a reddishbrown discolouration of portions of the stem (Fig 2), leaf stalks, leaf veins and pod stalks. The discolouration is most evident on, though not confined to, the stem tissue in the vicinity of nodes Frequently cracks develop in affected tissue and the epidermis or skin tends to flake off. The discolouration is usually confined to the cortical (outer) region of the stem, but near the base of severely affected mature plants the discolouration may extend right into the pith. Pockets of reddish-brown tissue are frequently found extending into the pith and these pockets often contain small cottony masses of celworins. In one of the three crops inspected, reddish-brown blotches were evident on some of the pods (Fig. Microscopic examination of these pods 3). showed the presence of eelworms associated with the discoloured pod tissue.

Severely affected plants may die, but most of the infected plants remain alive, though very stunted in comparison with uninfected plants, and yields are considerably less. The injuries to the stem near ground level render the plants very liable to be broken off and the growers concerned stated that in some seasons strong winds were responsible for almost the whole of the crop being broken off near ground level.

#### Resemblance to Other Diseases.

This disease should not be confused with the root knot disease, also caused by an eelworm and which is of common occurrence in this country. The root knot eelworm is responsible for swellings on the roots of beans and many other plants,

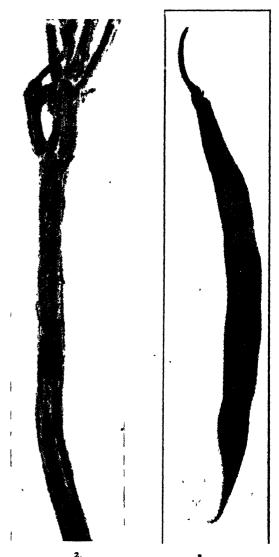


Fig. 2.—Bean Stem Showing Dissolouration, Cracking and Flaking-off of the Skin due to Stem Eelworm.

Fig. 3.—Besn Pod Showing Reddish-brown Blotches with which Eelworms were Found Associated.

but only in very exceptional circumstances have stem injuries been reported as due to this eelworm. The stem eelworm condition most closely resembles that produced by bean fly (Agromy a phaseoh), but in the case of bean fly, which is

Fig 4 —Stem of Tomato Seedling Grown in a Seed-bed Adjacent to Eclworm-infested French Beans

I elworms were found assigned with the diseased temato tissue

of importance only in bean crops sown in the late summer or autumn, it is usually possible to find the larvae of pupae of the insect in infected plants. The symptoms produced by the fusatium (Fusatium solani var martis) and rhizoctomia (Rhizoctomia solani) root rots on the lower parts of the stem are not unlike certain of the symptoms resulting from stem eelworm attack, but these two fungous diseases are not responsible for

swellings on the stem, and the red discolouration of the stem resulting from the infection with these fungi extends only an inch or so up the stem above ground level. The stem markings caused by halo blight (Bacterium medicaginis var phaseolicola) also bear some resemblance to stem eelworm injury, but the dark green water-soaked nature of young halo blight stem lesions often accompanied by a white pus-like bacterial ooze, plus distinctive leaf and pod symptoms, serves to distinguish the two diseases

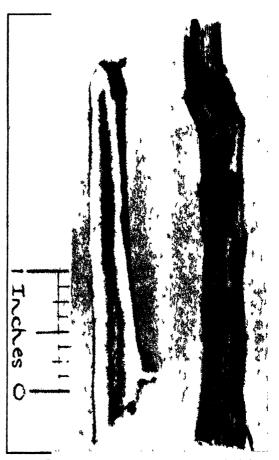


Fig 5 — Broad Rean Stems, One of which has been Cut to Show the Discolouration in the Pith

I electure were present in both the jith and the

#### Other Hosts of the Stem Eelworm.

In view of the known wide host range of A dipsaci, a search was made in the vicinity of the diseased Irrench beans f r other plants showing symptoms which might be caused by the celworm attacking the French beans. No such symptoms were found on any weeds but tomatoes (Liviapersicum esculentum) and broad beais (Vicia faba) showing such symptoms (Figs. 4)

and 5) were collected and examined microscopically. This examination showed the presence of eelworms in the stems of both the broad beans and the tomatoes. In the broad beans the eelworms were most abundant in the discoloured pith, though they also occurred in the blackened cortical tissue. Almost all of the broad beans in a half-acre patch appeared to be infected, but the effect on the plants appeared to be much less severe than in the case of nearby French beans. The tomatoes were taken from a seed bed in open ground adjacent to one of the diseased crops of French beans. Quite a number of the plants were as severaly affected as that shown in the accompanying illustration (Fig. 4). Other plants appeared to be free from the trouble and a nearby patch of tomatoes which had earlier been transplanted from the same seed bed was making very satisfactory growth.

An attempt has not yet been made by cross inoculation tests to determine whether celworms from the stems of French beans will attack broad beans or tomatoes or vice versa. The stem eelworm disease as it occurs on broad beans in England was described by Johnson and Thompson (4) in 1937, whilst the stem eelworm disease of tomatoes was first described in 1936 by Williams (1). There are several earlier records of the disease on broad beans than that of Johnson and Thompson (4). The eelworm species A. dipsaci includes a large number of strains and it has been shown by several investigators that a strain from one host may be almost restricted to that host plant, whilst strains attacking other plants may have a fairly wide host range. The stem celworm disease at Matcham appears to cause more commercial damage on French heans than on any other crop plant, and the evidence so far available suggests that the strain is one which specialises on French beans, but which may also attack broad beans and tomatoes. It is hoped to investigate further the host range of the celworm and thus determine what crops may be successfully grown on infested land.

#### Control.

The experience of the growers on whose farms the disease occurs has been that, once introduced into the soil, the eelworm remains there indefinitely under the system of farming commonly adopted in those areas of the Gosford district suitable for the production of early spring beans. Although other vegetable crops such as peas, potatoes, tomatoes, cucumbers, marrows, broad beans, sweet potatoes and swede turnips are also grown in these areas, the better financial returns from early spring beans mean that French beans are the predominating crop, and it is not unusual for an area of land specially suited for early beans to be sown year after year with this crop. Since, according to one grower, the disease has been present for at least twenty years, its present restricted distribution indicates that its spread to new areas is relatively slow and probably dependent on the transportation of soil particles or crop

refuse. However, the effects of the disease are so serious when once it becomes established in a soil that, should the disease occur in small isolated patches on land hitherto free from the trouble, it is strongly recommended that such patches of land should immediately be treated with carbon disulphide or with steam and all affected plants burned. Where adequate supplies of firewood are available, a cheap and satisfactory treatment would be to pile wood on the patch and set alight to it.

#### Measures Suitable for Larger Areas.

Where larger areas of land are affected these measures may be too expensive and in such cases the following procedure is recommended:—

All diseased bean plants should be burned at the end of the season and the land should not be sown with beans for at least two or three years. As far as possible, all measures should be adopted to prevent the spread of the disease to new areas through the transportation of soil from affected to clean areas. This applies particularly to soil carried on implements.

The choice of crops to replace beans for two or three years could probably be best determined by field experiments on infested land. Although tomato plants have been found infected with what appears to be the same stem eelworm as that which attacks French beans, the experience of one of the growers who has infested land is of interest. This grower planted tomatoes in the summer of 1940-41, followed by a bean crop in the spring of 1941. The stem eelworm disease, though present on the beans, was very much less severe than on beans grown on the adjacent farm where no tomatoes had been grown in the preceding year. It was stated by the two growers that, in earlier years, the incidence and severity of the disease had been much the same in spring plantings of beans on the two farms. Thus, although eelworms have been found in tomato stems, apparently responsible for considerable injury, the striking differences in the two crops of beans, grown actually within a few yards of each other, would justify further trials of tomatoes on infested land. Should a grower decide to grow tomatoes on infested land it is considered essential that the seedlings should be raised in clean soil (preferably soil which has been steamed or treated with both carbon disulphide and formalin) and that the plants be transplanted into the infested land only after they have made good growth in the seed bed.

If tomatoes would assist in reducing stem eelworm intection of beans they would be a very satisfactory rotation crop, since, with the advent of the Rouge de Marmande variety of tomatoes in recent years, highly satisfactory financial returns have been secured in the Gosford district from the planting of early crops of this variety.

It is not impossible that the explanation for the lessened incidence of infection in beans after tomatoes may be due to the eelworms having been attracted to the tomatoes on which the eelworms can feed, but in which they cannot come to maturity and reproduce themselves. In the microscopic examination of tomato stems no eelworm eggs were found, though these were common in affected bean plants.

#### Summary.

- t. A stein eelworm disease of French beans, hitherto unrecorded in New South Wales, has been observed on three farms at Matcham in the Gosford district.
- 2. The eelworm responsible is thought to be a strain of Anguillulina dipsaci (Kuehn) Gerv. and v. Ben.
- 3. There is evidence that the disease may have been present for at least twenty years at Matcham
- 4. Tomatoes and broad beans have also been found affected with what appears to be the same disease.
- 5. The symptoms of the disease are described and suggestions for its control are given.

#### REFERENCES.

- (1) Edwards, E. T. Strm nematode disease of lucerne. With review of literature concerning the causal organism Tylenchu dipsaci (Kuehn) Bast. Agr. Gaz. N.S.W., 43: 305-314, 345-356 1932.
- (\*) Goodey, T. The stem nematode Tylenchus dipracs (Kuchn, 1888). Observations on its attacks on pitatoes and mangolds with a host list of plants parasitized by it. J. Helm. 7: 183-200. 1929.
- (\*) Goodley, T. Plant parasitic nematodes. 306 pp. London 1933.
- (4) Johnson, L. R., and Thompson, H. W. Stem eelworm disease of held beans. Jour. Min. Agr 44. 130-137. 1937.
- (8) Steiner, G. The root-knot nematode attacking stems and leaves of plants. Phytopath. 30: 710. 1940.
- (\*) Steiner, G. and Buhrer, Edna M. A list of plants attacked by Tylenchus dipsaci, the bulb or stein nema Plant Disease Reporter, 16: 76 85. 1932.
- (7) Williams, P. H. A new eelworm disease of tomato. Gardeners' Chronicle, 99: 316. 1936.

## Brucellosis-free Herd Scheme (Swine). List of Accredited Herds.

The following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Allard, S. R., Cleobury Stud, Werombie Road, via Camden. Bathurst Experiment Farm, Bathurst.
Chapman, G. E. and Son, "Illabo Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Croft, F., Lugwardine, Kentucky.
Draper, R. E., "Glengar," Capertee.
Bade, E. M., "Bade Vale," Euchareena.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggerv, Water Lane, Rouse Hill.
Garrard and Price, Boorie Stud, Nimbin Road, Lismore.
Genge, J. I., "Springfield," Eugowra.
Grafton Experiment Farm, Grafton
Graham, E. H. Kluilabah Stud, Wagga.
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College, Richmond.

Hennessey, J., Pacific Stud Piggery, Holgate.
Holland, A. L. Argonne, Tubbul.
Maybin, N. C., Towac, Orange.
Macarthur (John) Memorial Agricultural High School, Gieufield.
McCaughey Memorial Agricultural High School, Yanco.
New England Expernment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shriley, G. F., "Camelot," Penrith.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud" Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell.
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp, Mannus.
Callan Park Mental Hospital, Callar Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla.
Emu Plains Prison Farm, Emu Plains.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital. Kenmore, via Goulburn.
Liverpool State Hospital and Home, Liverpool.
Masters and Upston, Whitmore Stud Farm, Wamberal, via
Gosford.

Morisset Mental Hospital, Morisset.
Oberon Prison Camp, Oberon.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Paterson, R. R., "Nostrebor," Matcham.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pike Bros., Wamberal, via Gosford.
Punnett, R. S., Brawlin
Smith, C. W J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

Don't let rumours or secrets get any further than you.

## INSECT PESTS.

Notes contributed by the Entomological branch.







## Spraying Late Tomatoes.

THE insect pests against which control measures are necessary in late tomato crops along the coast are the fruit caterpillar (Heliothis armigera), green aphids (Macrosiphum solanifolii), and the tomato mite (Phyllocoptes lycopersiai). Treatment for disease control is also necessary, and spray programmes for these late crops should, wherever possible, comprise combined sprays to control both insect pests and diseases.

## Weak Bordeaux for Vigorously Growing Plants.

Investigations by officers of the Entomological branch, into the use of these combined sprays, have shown that the best results will be obtained by mixing the necessary insecticides with a weak Bordeaux mixture.

The combined insecticidal-fungicidal sprays should be applied at weekly intervals from the middle of February onwards. For the early application, up to about the end of March, while the plants are growing vigorously and setting their fruit, lead arsenate, nicotine sulphate and colloidal or wettable sulphur should be applied in a 1:1:40 Bordeaux mixture (bluestone 1 lb., hydrated lime I lb., water 40 gallons). The use of a strong Bordeaux preparation during this vital growing period when most of the fruit is being set, will cause spray injury to blossom buds, flowers, and young fruits and cause a marked decrease in yield.

During April and May the strength of the Bordeaux could be safely increased to a 1:1:20 mixture without seriously affecting the yield (unless aphid infestation becomes severe, in which case a 1:1:40 mixture only should be used). The strong Bordeaux at this period will provide additional protection against early or late blight infection.

Before commencing the routine spraying with combined spray mixtures, the crop should be treated with lime-sulphur, 1 in 100, i.e.,  $3_k^1$  pints to 40 gallons, to control mite infestation. The undersurfaces of the leaves should be sprayed as thoroughly as possible as the mites must be hit with the spray to be killed.

#### Areas Where Moth is Serious.

In areas such as Kulnura and Mangrove Mountain in the Gosford district, where fruit caterpillar damage is serious every year, routine weekly applications of combined sprays should commence about the middle of February or when blossoming commences, and be continued over a period of 6 to 8 weeks. Three pounds of lead

arsenate should be used to each 40 gallons of weak (I:I:40) Bordeaux mixture where severe infestations are to be expected, and 2 lb. to the 40 gallons in areas where more moderate infestations are the general rule. During the spraying operations the mixture should be constantly agitated to prevent settlement on the bottom of the spray container.

Infestation is greatest during periods of heavy blossoming and fruit setting, and especially after a substantial fall of rain. The fawn or buff-coloured moths, measuring about 11/2 inches across the outspread wings, are commonly seen amongst the crop at such times, while the white to pale-yellow eggs, which are about the size of a pin's head, occur freely on the blossoms, young fruit and the tops of the plants in general. When such conditions occur, the crop should be dusted mid-way between spray applications with a lead arsenate-kaolin (1:2) mixture. In spraying, an all-over application should be made, paying particular attention to blossoms and young fruit; the dust should be applied mainly to the tops of the plants, the blossoms and young fruit.

#### Nicotine Sulphate for Aphids.

Nicotine sulphate should be added to the lead arsenate-Bordeaux (1:1:40) mixture only when aphid infestation shows signs of becoming severe, 16 fluid ounces being added to the 40 gallons of spray mixture. When spraying for aphid control it should be remembered that the aphids feed underneath the leaves as well as on the blossoms, fruit hands and tops of the plants, and that they will be killed only if they are hit with the spray.

Thoroughness of application is, therefore, of great importance in controlling aphids.

As a general rule it will be necessary to make a second application one week after the first to obtain satisfactory control. Under no circumstances should nicotine sulphate be mixed with strong (1:1:10 or even 1:1:20) Bordeaux mixture when spraying for aphids, as severe spray injury will certainly result.

The addition of nicotine sulphate to lead arsenate sprays does not give better control of tomato caterpillar, but there is some evidence that the nicotine sulphate as used for aphid control, assists in checking mites.

#### Autumn Crops.

For autumn crops that have been treated in the seed-bed for mite control, and again 3 or 4 weeks after transplanting, there is often no need to treat further for mite. However, should any of the plants at any time develop the typical symptoms of mite attack—the smooth, shiny, brown appearance of the stems and under surface of older leaves—treatment against mite should be made. The crop may be either dusted with sulphur or else colloidal sulphur; or wettable sulphur may be added to the combined Bordeaux-lead arsenate sprays.

Sulphur is generally mixed with an equal quantity of hydrated lime, but where it is desired to treat for both mites and caterpillars, lead arsenate powder should be mixed with the sulphur instead of the hydrated lime.

Wettable sulphur is used at the rate of 3 lb. to 40 gallons and colloidal sulphur at 1 lb. to 40 gallons of spray mixture. Wettable sulphur sinks quickly in the spray mixture and therefore good agitation is necessary to keep it in suspension.

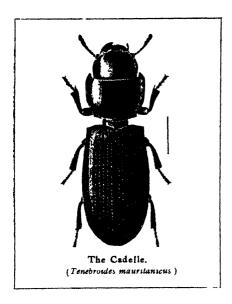
#### The Cadelle Beetle.

(Tenebroides mauritanicus.)

THE cadelle beetle is a cosmopolitan pest of various grains and grain products, and its occurrence in New South Wales was first recorded in 1898, although it was probably here before that time. It is found in mills, granaries, storehouses, etc., usually in association with other pests of stored grain and foodstuffs.

These insects prefer dark situations, and are to be found beneath or between sacks or other containers of their food materials, so that unless they are disturbed they are not readily detected.

Both larvae and adults are restless feeders and move about, feeding here and there. The adults are predaceous as well as granivorous, and will devour the larvae of other grain insects and even those of their own species. The larvae are not known to be predaceous, but feed on a great variety of cereal foodstuffs, grains (including wheat, maize, barley, etc.), and also on biscuits, bread, nuts, dried fruits and vegetables, etc. The kind of food eaten, however, has



a marked influence on the rate of growth of the larvae. Where various grains are attacked, both larvae and adults prefer to feed on the "gerins," and may move from grain to grain, thus damaging considerable quantities. The larvae may eat out all the inside of the softer parts of maize or wheat grains, leaving only a thin shell.

Scaled packets and cartons of various foodstuffs are normally free from attack by gram insects, but both the larvae and adults of the cadelle may eat holes through these containers and thus permit the entry of other injurious insects.

#### Description and Life-history.

The adult beetle, which measures about 3/8th inch in length, is shiny, and dark reddish-brown or black. It is elongate-oblong in outline and somewhat flattened. The adults are long-lived and many have been recorded to live for more than a year. Egg-laying may begin about two weeks after the insects become a fult, and may

continue over a long period. An individual female is capable of laying about 900 eggs.

The eggs, which measure slightly more than one-twenty-fifth of an inch in length, are spindle-shaped and opaque milky-white. They may be deposited either loosely or in clusters, in ground cereals or other materials, or may be placed in batches in crevices or grooves, in floor cracks or under loose flaps of packets or through the fabric of containers. Where the eggs are laid in batches, they are placed side by side, the average number in a batch being about twenty-five. The incubation period varies according to temperature, and may occupy from one to more than two weeks.

The minute young larva which emerges through one end of the egg shell is almost transparent. The fully-fed larva measures about 34 inch in length, and is whitish, elongate and somewhat flattened. It has a soft-skinned body, the head is dark and the first segment behind the head bears a dark chitinous shield. The tip of the abdomen bears a pair of characteristic, dark, pointed processes or pseudocerci.

The larvae, on maturing, may travel considerable distances, and bore into soft wood or other materials to form a small chamber in which to enter their pupal or chrysalis



Eggs of the Cadelle Beetle.

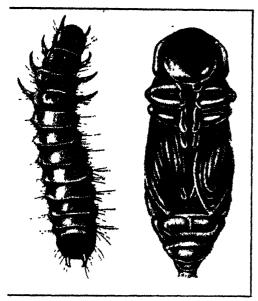
After Back and Cotton.

stage. They may construct their pupal cells out of pieces of grain or debris cemented together with larvae secretions, or may pupate in crevices or holes in bins, etc. In consequence of the wandering habits of the larvae at this period, many other stored products, not used as food by the larvae, may be entered and, frequently, considerably

damaged. Where suitable food is available, the larva may change into a pupa in from three to seven months. Under unfavourable conditions a larva has been found to live for more than three years.

The pupa or chrysalis, which measures about 3% inch in length, is of a uniform, pale-creamy colour, the legs and developing wings being readily seen. The prepupal period in the cell lasts for about nine days, and the pupal period from about eight days to a month.

The winter months are usually passed in either the adult or larval stages, and in cold climates the adults are more abundant during the late spring and early summer. The



Larva and Pupa of the Cadelle Beetle
[After Back and Cotton.

life-cycle from egg to adult, completed during a single season, may be from about nine to nineteen weeks, but where the larva hibernates the period may be from about thirty-nine to fifty-nine weeks. Under favourable conditions there may be two generations a year.

#### Control.

Both larvae and adults are very resistant to starvation and are able to survive for considerable periods without food.

The eggs and pupae are readily killed by low temperatures, but the larvae and adults are very resistant and have been found to survive for several weeks at a temperature of 15 to 20 deg. Fahr.

Thorough cleanliness is essential where foodstuffs are handled or stored. All accumulations of dust from food products, waste materials, grains and such like substances, should be kept off floors, etc., as deposits of these substances left lying about may serve as breeding grounds for the pests.

Owing to the habits of the larvae, of burrowing into the wood of floors, bins, partitions or into crevices, etc., when making their pupal cells, fresh, insect-free materials may readily become infested if stored in places which have previously contained infested materials.

Hardwoods should be used in preference to soft woods for the construction of bins or other containers, and the timbers should be closely-fitted. Any materials stored in them should be inspected at intervals for the presence of insects. The use of concrete bins for storage is one of the best means of preventing the rapid infestation of fresh materials.

Fumigation with carbon bisulphide or hydrocyanic acid gas may be resorted to. Where storage receptacles can be made reasonably gas-tight, carbon bisulphide is used at the rate of 5 lb. (approximately 3 pints) to every 1,000 cubic feet the container will hold, no notice being taken of the actual amount of materials within. A silo or shed that holds 1,000 bushels of grain when full would have an air space of approximately 1,300 cubic feet. smaller containers the dosage will be in proportion. The liquid may be poured into a shallow tray on top of the materials or on to bags placed on top

Carbon bisulphide has the disadvantage of being highly inflammable and explosive, and to overcome this, non-inflammable carbon bisulphide mixtures and mixtures of ethylene oxide and carbon-dioxide, ethylene dichloride and carbon tetrachloride have been prepared.

Where carbon bisulphide is used, no light or fire of any description must be allowed in or near sheds or buildings during the process of fumigation. The precaution should also be taken of cutting off the

electric current. Hot steam pipes have been known to cause explosion of this gas, and steam therefore should be cut off and the pipes allowed to cool before proceeding with fumigation.

The gas, which is heavier than air, should be allowed to act for twenty-four hours or longer. Where grain is required for seed purposes, the twenty-four hours should not be exceeded. After fumigation, the container or silo should be opened up to allow the fumes to escape.

Hydrocyanic acid gas is effective in killing all stages of the beetle that may be exposed to it, but under ordinary fumigation this gas does not penetrate bulk materials to kill the insects within.

Hydrocyanic acid gas, is one of the most poisonous gases known and fumigation with it should only be carried out by an experi-

enced operator.

Heating materials to a temperature of 120 to 130 deg. Fahr. for at least one hour will kill all insects present.

### White Wax Scale.

(Ceroplastes destructor.)

Where control of white wax scale has not been undertaken earlier in the season, growers are now reminded that the majority of the scales may have passed the young "peak" stage. If the scales are still in the "peak" stage, however, they may be controlled with a soda spray used at the rate of:—

(1) Fresh washing soda 8 lb Water ... 40 gallons

or

(2) Soda ash . . . . 3 lb. Water . . . 40 gallons

The amount of soda required is dependent upon the stage of development of the scales, so that where they are well-developed it may be necessary to use up to 15 lb. of fresh

washing soda or 5½ lb. of soda ash to every 40 gallons of spray. This amount, however, should not be exceeded.

A spreader, such as 2 lb. soft soap or 12 gallon of red oil, should be added to every 40 gallons of soda spray when white oil 18 not being used to control red scale.

If, however, red scale is also present on the trees, a white oil emulsion may be added to the soda spray, at the rate of a gallon of oil to 40 gallons of spray, and this will act as a spreader, in addition to controlling the red scale.

Rain falling on the trees a few hours after spraying may completely nullify the effects of the soda spray.

### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties.—

Australian Earliana, Bonny Best, Break-o'-Day, Improved Walker's Recruit, Red Marhio, Salad's Special

Cauliflowers- -

Hawkesbury Solid White, Nugget, Shorts.

Onion — Hunter River Brown, Maitland White

Pumpkins— Queensland Blue.

Beans-

Tweed Wonder, Brown Beauty.

Sorghum-

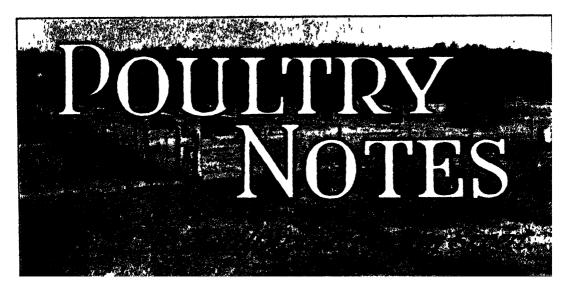
White African, Saccaline, Jones.

Japanese Millet-

Grasses, etc -

Phalaris tuberosa, Subterranean Clover (midseason), Sudan Grass, Lucerne.

## War Secrets Spread Like a Bush Fire.



## Reduction of Flocks.

## No Justification for Precipitate Action.

DURING the past month or so the markets have been glutted with hens and pullets from farms the owners of which are either going out of the business or reducing the number of birds in their flocks. Some of the sales of stock are due to poultry farmers joining the military forces or taking up work in war industries, while in some instances the reason for selling is sheer inability to meet commitments owing to low egg prices and high feed costs. This particularly applies where there are not sufficient hens to carry the growing pullets until they come into payable production.

The result of this wholesale marketing of poultry is that prices have slumped to very low levels and even pullets of laying age are being practically given away. It is stated that owing to labour difficulties poulterers cannot handle the volume of birds available and this has contributed to reduced prices.

Having regard to the fact that many poultry farmers have raised less pullets this season, it would appear that, if the present rate of selling hens and pullets continues much longer, there will be a greatly reduced surplus egg production next year.

The position created by low egg prices and the higher cost of feeding caused by liaving to substitute more costly items for mill offals is causing much concern throughout the industry, but there appears no justification for precipitate action as far as

those who have well-balanced flocks of hens and pullets are concerned.

The sound course to follow is to keep a close check on the laying of the different pens of hens and, where production falls below a satisfactory level, cull closely, retaining only those birds which appear likely to continue laying for some time. This means that the second-year hens will be gradually eliminated, while any first-year birds which show signs of breaking into a moult before April will, under present conditions, hardly pay to keep, as they will mostly not resume production for about three months, and during that time, on present feed prices, will cost nearly 2d. per week each to feed. A good deal dedepends upon the labour position on a farm as to whether it will pay to hold many of the first-year hens for a second laying

#### Look Over the Pullets.

ON farms where hatching operations were concluded by the end of September the youngest pullets will now be four months of age, and during this month is a suitable time to go through the flocks to eliminate any birds which have not made satisfactory development.

It is unprofitable to hold any pullets which, through unsatisfactory rearing conditions or for other reasons, are unthrifty and lacking in size, as these birds will not make much further growth until the cooler weather of the autumn commences, and will rarely come on to lay before the end of the autumn or later. Even when they come into production

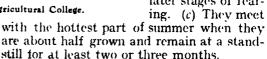
and dispose of such weaklings. It would pay better to carry over some of the late moulting second-year hens rather than hold the unsuitable pullets.

#### Causes of Unthriftiness.

If the young stock are raised under reasonably good conditions there should be but few of those hatched up to the end of September which are lacking in development, but many of the birds hatched a couple of weeks later, especially if run on stale ground, will not thrive satisfactorily, and thus result in loss to their owners.

Some of the principal reasons for poor development of late hatched chickens are—

(a) They are usually run over the same ground as previous lots and are thus subject to infection by any disease germs which may be present, or to infestation by worms. (b) In many cases they are over-crowded in the brooders or during the later stages of rearing. (c) They meet



The only circumstances under which these late chickens are likely to do well are where they have almost unlimited range, or when only one small batch is reared in clean pens.



Pullets Under Ideal Conditions at Hawkesbury Agricultural College.

most of them will not lay as well as those which have not had a setback.

Many poultry farmers are reluctant to cull these pullets, and they hold them in the hope that they will lay during the season when egg prices are highest, but such hopes are vain, and it is better to face the situation

## Preparing Competition Birds.

THOSE who have entered hens for laying competitions should make a preliminary selection of a number of birds during this month and get them accustomed to conditions similar to those obtaining in the particular competition.

The best course is to select three to four times the number of pullets required and include different ages so that any which become too advanced before the commencement of the competition can be replaced by younger birds.

If the ration being fed on the farm differs materially from that in the competition it should be gradually changed over. This particularly applies in cases where a dry mash is fed on the farm and a wet mash in the competition. Unless the pullets are

#### FEBRUARY 1, 1942.]

accustomed to the ration which they will receive in the laying test there is considerable risk of their breaking into a moult and thus militating against their chances of participating in the prize list.

There is usually a large percentage of birds, particularly among the light breeds, which break into a moult soon after entry, but whether this is largely due to a change in the method of feeding or to other causes it is not possible to say. As far as the Hawkesbury College Test is concerned most competitors know the composition of the ration fed, but for the information of any new entrants the particulars are given hereunder:—

Morning.	
Wet Mash.	
Pollard	60 lb.
Bran	33½ "
M.I.B. Meat meal (now 55 per cent protein)	6½ "
	100 ,,
Salt	22 Oz.
Midday.	
Green Feed	
(Mainly lucerne or Berseem clovately 1½ oz per bird.)	er, approxi-
Afternoon	
Wheat	. 67 lb.
Maize	. 33 "
	100

### Ravages by Foxes.

Foxes are reported to be more troublesome to poultry flocks in the county of Cumberland than for many years past. This is no doubt due to the continued drought conditions causing a shortage of natural food. In a number of instances the foxes have killed fowls on farms in closely settled areas where no trouble from these marauders would be expected.



When Opening Up the Bait Do Not Touch It With the Hands.

Usually an ordinary 6-feet-high wire netting fence, if in good condition, will keep foxes out of poultry yards, but when they are extremely hungry they will often scratch a hole under the netting, or in some cases jump over the fence. Mostly, however, where they get over a fence there is something, such as a stump or tree, near the fence which helps them to climb over; in other cases, the fence may be leaning over.

In closely settled areas where it is not possible to lay poison on account of the risk of poisoning neighbours' dogs, cats or even fowls, one of the best means of protecting the birds, other than by shutting them in the houses at night, is to have several dogs chained to lines of No. 6- or 8-gauge fencing wire along the exposed boundaries of the farm. This method has been in use at Hawkesbury Agricultural College for many years and has been found very successful.

Those who can lay poison without risk to other animals might adopt the procedure followed at Hawkesbury Agricultural College some years ago, when thirteen foxes were poisoned in one night. The method adopted was to take a fowl which had been freshly killed and open it up with a long-bladed knife without touching the fowl with the hands; then lightly sprinkle strychnine sulphate on the visceral organs. The bird was then carried on a pointed stick to the place where the foxes were expected to come, and thrown as far as possible to avoid any possibility of the foxes detecting that it had been laid by human agency.

When foxes gain access to a poultry yard they will usually kill large numbers of birds, apparently just for the sheer lust of killing, and in many cases only slight punctures on the back of the birds can be detected

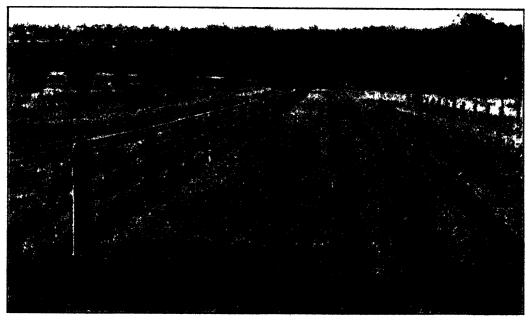
#### Green Feed Crops.

MARCH and April are two of the best months for planting lucerne and clovers, and where it is desired to sow such crops it is now necessary to undertake the preparation of the land without delay.

The planting of the crops will, of course, be dependent upon adequate rainfall, as it would be impossible to establish any crops if the dry weather conditions which exist at the time of writing continue for the next couple of months, because the limited watering which can be given under present conditions is not sufficient to ensure proper

barley, oats and silver beet, while rape, kale and wong bok could be sown between February and April.

During the past year there has been a shortage of Berseem clover seed, but some of the leading seed merchants advise that they expect to have fresh supplies available soon. This crop is one of the best for providing a supply of green feed during the winter and early spring months, when lucerne is slow in growth. Under most conditions the best results are obtained by sowing it in drills the same as for lucerne.



A Green Fodder Crop.

growth. This, of course, applies only to districts where water restrictions are in force, but, in the absence of satisfactory falls of rain, those not depending upon the city water supply will be in the same position.

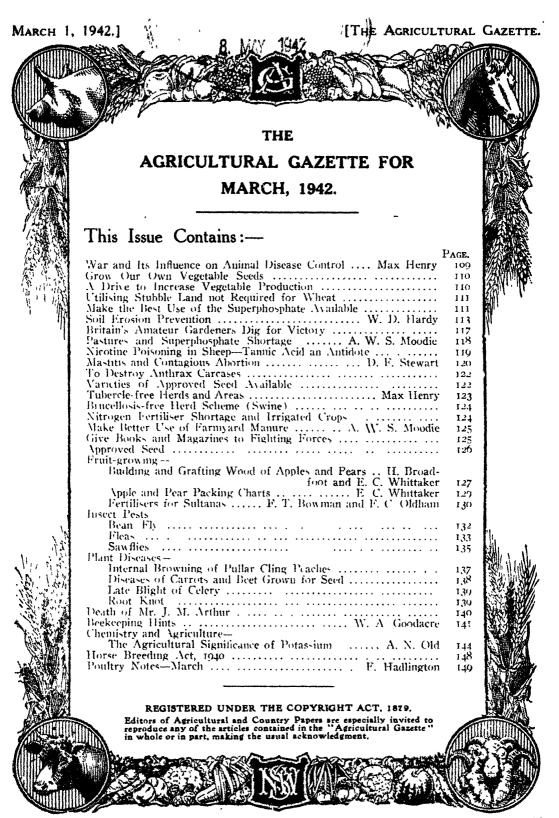
Although March and April is the best time for these crops, they may still be sown during May if it is not possible to do so earlier, but the results are not so certain, particularly as far as Berseem clover is concerned.

Other suitable crops which could be planted between February and May are

but where the land is clean there is no objection to planting it broadcast.

The importance of an abundant supply of green feed cannot be too strongly emphasised from the standpoint of the health of the birds, and at a time like the present, when there is a shortage of mill offals, chaffed green feed could partly take the place of bran or coconut meal, etc., in making a wet mash.

In this way it could be used to the extent of about one-third by measure of the morning mash.



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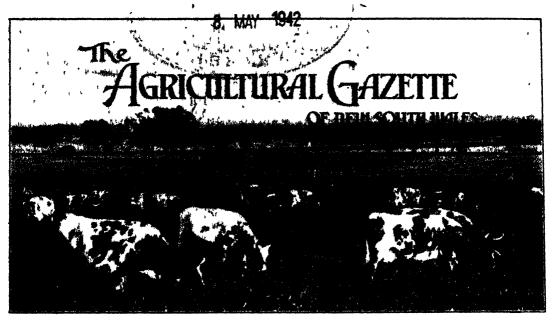
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#### The Agricultural Gazette.

March, 1942.

## WAR AND ITS INFLUENCE ON ANIMAL DISEASE CONTROL.

MAX HENRY, B.V.Sc., M.R.C.V.S., Chief, Division of Animal Industry.

SINCE the nature of infectious disease has been understood, war has been recognised as one of the most important factors influencing the spread of animal diseases falling within that category. War also brought forward the necessity of combating these diseases because it was the ravages of disease amongst the horses of European armies which brought about the establishment of veterinary colleges.

Many examples of the influence of war could be cited, but two examples will suffice. The South African War (1899-1902) left that country with a legacy of disease spread from end to end of the territories concerned and this was a potent factor in the establishment of the great research station of Onderstepoort. The European War of 1914-18 saw western Europe re-invaded by diseases which had been eradicated by long years of patient work, and saw England re-infected with rabies. It is too much to anticipate that the present war will be an exception to the rule.

sent war will be an exception to the rule.

It is not necessary to seek far for reasons to explain the evil influence of war in this regard.

Even in a country at war but not invaded there is an inevitable dislocation of peacetime activities. The energies and thoughts of men are transferred.

to wartime problems. Some at least of those engaged in disease control will be required by the fighting services and the young men who might shortly take their places will not be available because they will be on military service.

If this weakening of control occurs in a non-invaded country, it can be realised to what extent internal control must vanish in an invaded country. The whole regulatory machinery breaks down, and if disease is present in the country it spreads unchecked until the situation becomes stabilised in one direction or another.

If neighbouring countries are at war, one infected with a particular disease and the other free, the opportunity for that disease to cross the international boundary is very great

This spread from country to country during war is not limited to neighbours Normal shipping procedure is dislocated, ships arrive unexpectedly at ports with cargoes not destined for that port, and under the stress of emergency disease-carrying material may be landed in a country which in peacetime prohibited such entry. It is dangerous to assume that only the living animal will spread disease. Even under peacetime control serious epizootic diseases are introduced at times from overscas by animal products such as meat and hides. Australia, America, South Africa, and New Zealand have all undergone such experience in peacetime The danger in wartime is much greater and is but one indication of the necessity for maintaining a veterinary quarantine service functioning actively as long as is possible. Another source of spread in war is the tendency of soldiers and sailors to adopt animal pets in foreign countries and endeavour to introduce them to their home lands when returning on leave or for discharge tom service. This is a danger very difficult to guard against because

The risk of the introduction of disease by land or sea has been recognised for a long while, but

of the sentimental feelings aroused

the aeroplane has added in the last thirty years another very difficult problem. Australia owes much of her freedom from serious disease to her isolation in the years of early settlement, but the conquest of the air has broken down that isolation. In this country already veterinary quarantine officers have been faced with new situations and have met with most unexpected problems which required solution in the direction of safeguarding Australia.

The question of evacuating live stock from coastal areas in the eastern States requires careful consideration from this viewpoint. Stock movements carried out under stress will almost inevitably mean the spread of such diseases as pleuropneumonia, tick infestation and tick fever, buffalo fly infestation, stickfast flea infestation, and probably the spread of other parasites, internal and external. To some degree or other the veterinary services of this country will be faced later with the problem of recovering the lost ground. It

will not be easy and it will involve the maintenance of a strong and well-trained staff. The extent to which it will be possible depends on the characteristics of each particular disease or parasite. In the present state of our knowledge the hope of regaining ground lost, say, to the buffalo fly, would appear remote.

The question of an increase in deficiency diseases of live stock may not be so marked in Australia as in a country such as, say, Denmark, but it will be necessary to develop our own resources in the production of some of the protective foods for which we have to a large extent previously depended on oversea markets, and the difficulty of securing fertilisers may have an unfavourable influence.

Certain drugs, particularly those used against parasites, may become difficult to secure, but this should be a stimulus to our own research people to make attempts to find effective substitutes.

#### Grow Our Own Vegetable Seeds.

WHAT Britain has done, under extreme difficulties, in the way of producing her own vegetable seed requirements should encourage Australians to face-up with confidence to the threatened seed shortage in this country. In 1941, with fewer workers and in spite of remarkably bad weather, Britain produced a larger acreage of all kinds of vegetable seeds than ever before. It was necessary, for the demand that year by farmers, vegetable growers and home gardeners—all of whom entered most enthusiastically into Britain's "Dig for Victory" campaign—was a record.

There is ample evidence that Australia can - often with advantage—supply the bulk, if not all, of its vegetable seed requirements. It is a case of getting down to the job in earnest

Discussing the seed problem recently, Mr. A. C. Orman, Senior Agricultural Instructor, drew attention to the opportunities now offering to growers in the production of cabbage seed, most of which was imported prior to the war. The production of cabbage seed had been neglected by local growers, said Mr. Orman, mainly because of the difficulty of competing with the relatively low prices of imported seed. In recent years the quality of imported seed In recent high, due principally to the presence of diseases and impurities. I ack of uniformity in a variety was a serious tault, because it extended the harvesting period and consequently added to cost of production. These defects had been noticeable grown in New South Wales—Succession, Enkhuisen Glory and Copenhagen Market.

It had been his experience, said Mr. Orman, that the successful production of cabbage seed was possible only in districts having a high attitude, such as Bathurst, Tenterfield and Moss Vale

In fact, the requirements for a cabbage seed crop closely approximated those of the swede turnip. Coastal districts and the warm inland areas were unsuitable, because the high summer temperatures adversely affected the seed or the pods and favoured aphid infestation. Efforts to raise seed on the Lower Hunter had been disappointing for those sam' reasons.

The usual method employed in producing seed was to sow the main crop in the autumn so as to have the heads maturing during the winter, when they were selected to conform with varietal type and freedom from disease. The heads were allowed to run to seed during the spring. Some growers marketed the heads and allowed the stumps to run to seed, which was satisfactory in some conditions. It was advisable for intending seed growers to commence on a small scale at first with one, or possibly two, of the best commercial varieties and select the plants rigidly so as to commence large scale production with good quality seeds.

The Department is keen to assist growers in any way possible and invites inquiries for further advice on the production of seed of cabbages or other vegetables.

#### A Drive to Increase Vegetable Production.

AN urgent appeal is made to growers and home gardeners in all vegetable growing districts to intensify production. Apart altogether from supplying civil requirements, large quantities of fresh and canned vegetables are needed for the fighting forces. The demand for this latter purpose is already considerable, and is likely to increase greatly if, as suggested,

Australia is to be used as an Allied base in the Pacific War Zone.

SIVFRAL factors—the prolonged dry spell, labour shortage, etc—have combined to bring about a serious shortage of vegetables. Although the complete solution of the problem depends very largely upon adequate falls of rain in the near future, it is felt that an immediate and substantial

increase of production is possible in some districts even at the present time. This applies particularly to growers in localities where irrigation is possible. Quick maturing crops such as beans, turnips, beetroot, silver beet, lettuce (in certain districts), cucumbers might be given immediate attention. Carrots, tomatoes, parsnips, cabbages, cauliflowers and peas may also be sown. Although growers without irrigation facilities cannot be expected to make sowings now, they are advised to have the ground in good condition in readiness for sowing as soon as the weather improves.

Potatoes, in particular, are in very short supply at present and it is imperative that steps be taken immediately to increase production wherever possible. Growers in those coastal districts where conditions are now favourable can appreciably contribute towards maintaining supplies of this essential food by increasing their autumn plantings to the utmost. Those who have seed on hand are urged to make it available to other

growers for planting. Experience has shown that Factor variety is one of the most suitable for autumn planting, but under existing conditions it is considered that all available seed of all varieties which can be expected to give satisfactory results should be planted as soon as conditions permit.

The Department is convinced that when growers realise the seriousness of the present low level of vegetable production, and fully appreciate the importance of these crops in the nation's wartime food problem, there will be a concerted drive, even in the face of existing difficulties, to make up a good deal of the leeway.

The Department invites inquiries for advice or guidance on any aspect of vegetable growing, and to assist further in this respect is supplying topical cultural, pest and disease control notes each week to country and metropolitan newspapers. Watch your local paper for this regular feature

#### Utilising Stubble Land Not Required for Wheat.

WHEAT farmers may make good use of stubble land which they do not intend to crop this year by laying it down to pasture and thus providing more and better feed for stock. No better use could be made of the land until such time as the wheat position improves or diversified farming becomes stabilised.

The most suitable plants to grow are Wimmera rye grass and clovers, either subterranean clover, native clovers or trefoils, each at 4 lb. per acre. Should bulk of feed and earliness be important factors, a light sowing of oats (15 to 20 lb. per acre) would help considerably, but would, of course, retard the development of the grass and clovers. The success of such growings depends upon favourable and early rains, but March sowings are usually better than those made later.

Where such a stubble area is to be seeded, a seed bed must be prepared. If stubbles are light, use the sundercut to a shallow depth and seed to 1 inch with a combine, using trailer harrows, but where stubbles are heavy, as in cases where 30 bushel crops have been harvested, the stubble might have to be burnt to permit cultivation.

Use 1 cwt. of superphospalite per acre if available, but should the fertiliser be unprocurable the

clovers should be left out of the mixture, and tairly satisfactory results will be obtained with the Wimmera rye and oats.

If the intention is to use land for pasture in 1943, a seeding of pasture plants may be made with this year's crop, and the plants allowed to seed to provide self-sown pastures. When sowing with a cereal crop, half the quantity of seed should be used.

The usual practice with self-seeded areas is to leave the stubble land undisturbed, and to apply 1 cwt. of superphosphate; the stubble cover, heavy seeding and soil drift will ensure germination. The addition of oats to self-seeded areas may not be advisable unless the self-seeding has been sparse, but should the oats be added, then the seed bed preparation becomes necessary. The sowing of oats without suitable cover is a useless waste of good seed

A short-term pasture of annual plants gives good results, but should the pasture be maintained into a second or a third year, it becomes a pasture period of a crop rotation which will do much to maintain soil fertility. Short-term clover pastures must be annually fertilised with I cwt. of superphospate per acre.—H. BARTLETT, Senior Experimentalist.

#### Make the Best Use of the Superphosphate Available.

The problem of making the best use of the reduced quantity of superphosphate now available—only 60 per cent. of normal requirements is available this season—is a complex one. It is especially difficult because the usual rate of application of superphosphate in Australia has always been light, with the result that such a heavy cut in supplies is likely to affect crop yields seriously.

Growers of cereal crops which normally require applications of superphosphate for payable returns will be divided in opinion as to whether it is preferable to sow the usual area of crop

and apply less fertiliser per acre over the whole area, or to sow only such area of crop as can be given a full application of superphosphate.

The conditions vary greatly on different farms, and the growth of crops is influenced so much by the seasons, that each farmer must decide for himself the best course of action in the light of existing circumstances and past experience. There are several guiding principles, however, which should prove helpful. These were outlined by Mr. A. H. E. McDonald, Chief of the Division of Plant Industry

Only when adequate moisture is available is the full benefit of superphosphate obtained, and this requirement is more likely to be found in fallowed than in stubble land. During the last two years of very dry conditions most crops on stubble have been failures, both with small and full applications of superphosphate. The wisest plan, therefore, would appear to be to use available supplies as far as possible on fallowed land only and thus ensure full benefit of the fertiliser used.

It can be very definitely stated that reduction in the amount of superphosphate used will be felt least when trops are sown fairly early in the season on land which has been well prepared. Generally speaking, it is preferable to apply some superphosphate at least to all land that is sown and normally needs superphosphate, as one of its main effects is to give crops a quick vigorous start. An exception to this generalisation has to be made in the case of much of the light soil which depends entirely on superphosphate for payable yields. In such cases it would be preferable to reduce the area cropped in order that the normal superphosphate application could be applied to the area actually sown.

#### Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Bathurst Experiment Farm (Ayrshires) 21 Bauerle, P. A., Holbrook 20 Carrick, G., 'Clonlea,'' Central Tilba 34 Cowra Experiment Farm (Ayrshires) 41 Cowra Experiment Farm (Ayrshires) 52 Corrick, A., Meryla, Morven 35 Department of Education—Farm Home for Boys, Mittagong Dixson, R. C., 'Elwatan,'' Castle Hill 24 Edwards, G. M., "Rothwick," Uralla (Jerseys) 5 Fairbridge Farm School, Molong 32 Farrer Memorial Agricultural High School, Nemingha 27 Forster and Sons, Abington, Armidale (Jerseys) 68 Forster, N. L., Abington, Armidale (Jerseys) 68 Forster, D. L., Abington, Armidale (Aberdeen-Angus) 69 Hill, E. Pritchard, Bowling Alley Pt. (Jerseys) 100 Hordern, E. D., Cabramatta (A.I.S.) 95 Hurlstone Agricultural High School Glenfield 58 Kenmore Mental Hospital, Kenmore 52 Killen, E. L., "Pine Park," Mumbil 32 Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus) 48  McSweeney, W. J., "The Rivers," Canowindra (Beef Shorthorns) 31 Martin Bros., "Naroma," Urana-road, Wagga 150 Morisset Mental Hospital, Carrick, Grose Wold, via Richmond (Jerseys) 132 Mava Ltd., Grose Wold, via Richmond (Jerseys) 132 New England Experiment Farm, Glen Innes (Jerseys) 122 New England University College, Armidale (Sprseys) 123 New England Hospital, Repair 122 New England University College, Armidale (Sprseys) 123 New England University College, Armidale (Sprseys) 124 New England University College, Armidale (Sprseys) 124 New England Hospital, Repair 122 New England University College, Armidale (Sprseys) 124 New England University College, Armidale (Sprseys)	Owner and Address	Number in herd.	Owner and Address.	Number in herd.
McEachern, H., Tarcut'a (Red Po'l)  McSweeney, W. J., "The Rivers," (anowindra (Jerseys) 51  Young, A. H., Rock Lynn," Cudal (Polled Beef Shorthorns) 7	Bauerle, P. A., Holbrook  Bush, W., Ben Lomond  Carrick, G., 'Clonlea," Central Tilba  Cowra Experiment Farm (Ayrshires)  Curtis, A., Meryla, Morven  Department of Education—Farm Home for Boys,  Gosford  Department of Education—Farm Home for Boys,  Mittagong  Dixson, R. C., 'Elwatan," Castle Hill  Edwards, G. M., "Rothwick," Uralla (Jerseys)  Fairbridge Farm School, Molong  Farrer Memorial Agricultural High School, Nemingha.  Forster and Sons, Abington, Armidale (Jerseys)  Forster, N. L., Abington, Armidale (Aberdeen-Angus)  Hicks, A. A., Estate, Culcarn  Hill, E. Pritchard, Bowling Alley Pt. (Jerseys)  Hordern, E. D., Cabramatta (A.I.S.)  Hurlstone Agricultural High School Glenfield  Kenmore Mental Hospital, Kenmore  Killen, E. L., "Pine Park," Mumbbil  Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus)  McEachern, H. Tarcutta (Red Po'l)	9 20 34 41 35 40 38 24 5 75 27 68 174 4 130 95 8 100 202 4 8 9	Shorthorns)  Martin Bros., "Narooma," Urana-road, Wagga  Morisset Mental Hospital	150 65 132 97 120 60 120 121 38 57 82 85 30 66 66 88 48 32

MAX HENRY, Chief of Division of Animal Industry.

#### Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

Tumut (T. E. Wilkinson) Yeoval (J. A. Stapleton) Gulgong Dunedoo Tumbarumba (L. G. Roth) Mendooran Cessnock (Bill Brown) Binnaway Cooma (W. G. Metralfe)	, 4. , 4, 5. , 9. , 11, 12. , 12. , 13, 14	Coonabarabran.  Baradine Peak Hill (L. H. Roache) Condobolin (N. J. Hanlen) Bogan Gate (J. T. a Beckett) Trundle (W. A. Long) Tullamore (W. J. Colville) Parkes (L. S. Seaborn) Forbes (W. D. Roberts)	", 24. July 28, 29. Aug. 4, 5. ", 8. ", 11, 12. ", 12. ", 24, 25, 26.
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## It isn't clever to talk of military matters. It's Disloyal.

## Soil Erosion Prevention

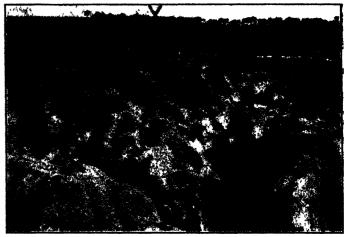
## And Control

on the

## Southern

## Tableland.

W. D. HARDY, B.Sc.Agr., Assistant Agrostologist.



Erosion of Over-grazed Granite Country Near Crookwell.

A programme of pasture improvement, a level contour bank, and exclusion of stock are the controls indicated in such a case.

THE Southern Tableland of New South Wales comprises a large tract of country which is favoured generally by good soaking autumn and spring rains, and accordingly the establishment of excellent pasture swards, particularly of subterranean clover is not a difficult matter. The development of a thick sward of vegetation (grasses and clovers) has been proved, time and time again, to be the cheapest and most effective of preventing soil erosion and of controlling soil erosion.

In United States of America it has been shown by experiment that where the pasture is dense, and organic matter (humus or plant remains) plentiful, up to 40 per cent. additional rainfall can be absorbed by the soil, and thus one cause of erosion, namely, rapidly running water ("run off") is reduced to a minimum.

As far as the Southern Tableland is concerned, it is this "run off" water which causes practically all the serious erosion, and therefore any method used to combat erosion must aim at a reduction of surface "run off."

A certain amount of damage is caused by wind, and hence one cannot overlook the value of tree lots, shelter belts or windbreaks in reducing the velocity of wind and so reducing its erosive power. Apart from this direct action, however, windbreaks have an indirect action in erosion control in that evaporation from the soil and pasture swards is reduced, and thus a greater amount of moisture is available for the

growth of grasses and clovers; more vigorous and productive and longer lived ground cover is the result.

#### How Pastures Prevent Erosion.

It can be said that vegetation (pasture sward) reduces erosion in three ways:—

- (a) Humus or organic matter derived from the pasture (particularly from the clover or legume portion) acts as a sponge, and thus water absorption by the soil is facilitated.
- (b) The leafage and stems act as a canopy, and thus prevent water beating down on to the surface soil, and not only destroying the physical condition of the soil and therefore reducing its absorptive capacity, but churning the soil particles into a muddy suspension in the water, so that they are readily carried away in the run off. The run off from a ploughed paddock or sparsely covered pasture land is turbid, whereas that from an area covered by a dense pasture sward is practically always quite clear.

(c) Roots of plants act as binders and so help to hold soil particles together. In addition they help increase the absorptive capacity of soils. For example, subterranean clover is an annual and dies off with the advent of hot weather in summer. The roots of the plant decay in situ, thus forming small channels throughout the soil and so enabling water to penetrate more freely and to greater depths.

The rainfall of an area is the chief agency controlling the vegetation; the rainfall conditions of the Southern Tableland have developed a good forest cover or good thick natural pasturage composed of such species as wallaby grass, wheat grass, spear grass, tussocky pea, ball clover, and in a few instances burr clover or burr trefoil.

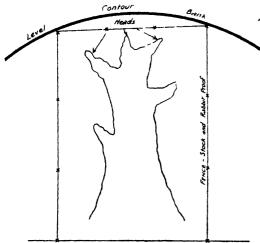


Diagram Showing Level Contour Bank Across Path of Water to Protect Head of Gully,

#### The Influence of Management.

Such a pasture sward should hold the soil together in an uncroted condition, but, due to bad methods of management, such as over-grazing, coupled with failure to control rabbits, failure to use superphosphate, cropping of the land with the same type of crop year after year, or failure to resow a cropped paddock to grasses and clovers, this natural pasture sward has been greatly thinned out, and, consequently, serious erosion has occurred in many centres.

The rapidity with which serious erosion can occur is exemplified in the case of damage done by one heavy storm on a light granite soil in the Crookwell district. In this instance a gully some 4 feet deep and

18 inches wide, was eroded down to 8 feet deep overnight, and the banks were undermined. The banks have since caved in, the soil being washed away, and now there is a deep gully some 6 feet wide. All this has happened during a period of approximately fifteen months.

That erosion of such a nature as that described above, can be prevented or controlled in light soil types (heavy soils as well) by pasture improvement has been proved beyond all doubt by Mr. C. E. Prell, Gundowringa, Crookwell. Mr. Prell points proudly to gullies which years ago were deep and steep, and croding actively, but now, due to the application of a fertility building pasture programme, have had their "heads' checked, are filling in gradually and are now only mere undulations on the landscape. Instead of showing bare soil, these "spent" gullies are covered by a thick sward of perennial rye grass and subterranean clover. Mr. Prell's method was first to build up the soil fertility with subterranean clover, top-dressed in the autumn of each year with I cwt. superphosphate per acre and then introduce deep-rooting grasses, such as perennial rye grass, etc.

To establish subterranean clover all that is necessary is to scratch or "combine" 3 to 4 lb. of seed and 1 cwt. superphosphate per acre into the natural pasture and to top-dress with superphosphate in the autumn of each year.

Such a sward of subterranean clover increases the effectiveness of the rainfall. Only light showers are required for pasture growth on such areas. In addition a "canopy" of foliage is maintained over the soil surface and erosion is reduced. So effective has subterranean clover been in reducing surface run off, that on some properties dams have deen deprived of much water, and water for stock has become a problem.

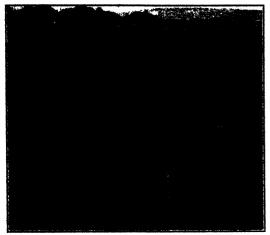
The maintenance of a vigorous pasture sward is thus the ideal method of preventing or controlling soil erosion on the Southern Tableland.

#### The Role of Mechanical Aids.

However, other methods, such as (a) mechanical only; (b) a combination of mechanical methods and pastures, and (c) cropping programmes, have been fairly widely used.

#### March 1, 1942.]

A combination of mechanical aids and the use of pastures will greatly accelerate results. Mechanical methods include the following:—Contour banks (with and without a fall), contour furrows and modifications, concrete spillways at the "heads" of the gullies (the idea being to divert the run off into one controlled channel), and small "dams" at intervals along gullies.



On the Left of this illustration is shown the Vigorous Growth made, even in 2 Dry Year such as the present onc, when Stock are Excluded.

A gully was developing in this area

They must be regarded as temporary measures and are of little value unless used in conjunction with a sound pasture improvement or a wise crop rotation programme. Used by themselves they sooner or later break down

Contour banking of pasture and crop land is being widely and successfully used on the Southern Tableland. This method is easily adapted to most land where the surface is not broken by too many wide, deep gullies. The main point to remember with this method is that the outlet from the banks must be on to a well-grassed area.

Where gullies are very wide and deep, with many "heads," and hence are eroding actively, a control measure coming into favour is to fence off the eroded area (including a portion of the uneroded land) and keep out all stock (including rabbits), the aim being to allow all herbage to develop a strong root system which will bind and hold the soil. (Sce diagram.)

A wise plan is to plant trees, such as willows, poplars, black locust, etc., in the banks and on the "floor" of the gully. At

the same time a level contour bank should be run (if possible) across the path of the water, so as to divert it from the "head" (or "heads") of the gully. The important thing to do is to prevent as much water as possible from reaching the "head" of the gully, because it is at the "head" where active erosion occurs.

Some graziers encourage more rapid development of grasses and clovers in the "heads" by tipping in sheep manure obtained from under the shearing sheds. When gullies are close to shearing sheds this is quite a cheap and efficient remedial measure when used in conjuction with the fencing and the contour bank to divert water.

The silting up of gullies can be expedited by building small temporary dams at intervals across the gully, the material used being usually stones or logs or fine mesh wire netting, and in somes cases concrete.

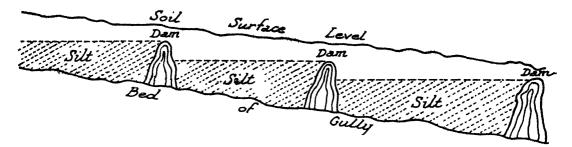
The object of the dam is to hold water temporarily, so that silt will be deposited and the bed of the gully built up, in most cases, with a rich deposit of soil and organic matter. As the silt is deposited the wall is built higher and higher, and new dams may then be constructed in the intervening spaces between the original dams. The gully in effect becomes terraced (See



Portion of the above Fenced-off Area.

Showing the effect of a silt-saving dam. The man is standing in the course of the water, where i good cover of herbage has developed on the silt collected.

diagram.) Grass and clover seed is sown in the silt and with the extra moisture present a dense sward which will help hold the soil (silt) soon develops.



Longitudinal Section of Gully Showing Terraced Effect of Silt-saving Dams.

On his property at Goulburn the Premier of New South Wales (Hon. W. J. McKell) has constructed out of logs and stone many of the above types of "silt-saving dams" and across one or two of the wider gullies, which are 4 to 5 feet deep, he has constructed concrete walls. The latter, apart from being effective "silt catchers," are providing excellent water reserves. During December, 1940, and January, 1941, when heavy storm rains were experienced in the Goulburn district, up to 18 inches of silt collected in these silt-saving dams.

Mr. K. D. McKenzie, Flowerburn, Peelwood, has had excellent results in arresting gully erosion by using a method which could be called "herringbone" contour furrows. (See diagram on page 117.) The aim in this case is to prevent any water flowing into the gully and so causing a concentrated erosive action. Each contour which is prepared by one cut of a 2- or 3-furrowed plough, has a slight fall (up to ½ per cent.) away from the gully and empties on to undamaged pasture land. The pasture land is thus :rrigated; a greater proportion of

the rain that falls is used more effectively and further erosion in the gully is prevented.

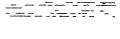
#### Erosion Control by Crop Rotation.

Not enough attention is given on the Southern Tableland to suitable crop rotations aiming at the maintenance and improvement of soil fertility and thus reducing soil erosion to a minimum.

Decline of soil fertility causes a reduction in the quantity and quality of the herbage growing on the soil. Such herbage is generally very sparse in top growth, which means a lowering of its humus-producing qualities and, furthermore, root development is practically always very poor. Both the above factors render the soil liable to slow, insidious crosion at the beginning, but as fertility decreases, the rate of erosion increases.

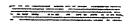
A crop rotation (including pasture) designed to maintain fertility and to build up the humus content of the soil is probably the best method of preventing erosion, but once erosion has begun, due, say, to cropping the



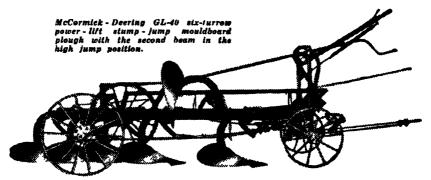


Treatment of a Gully Inside a Fenced-off Area.

Lombardy Poplars
planted three years ago
have held considerable
silt, and grass and cloverhave made good growth
on the sides of the gully.
A contour bank was used
to divert the water from
the gully.



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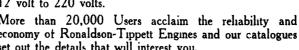


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same land year after year with the one type of crop (c.g., oats) the erosion can be largely controlled by swinging over to a

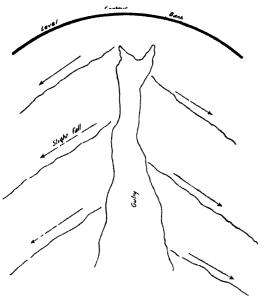


Diagram Showing Herring-bone Contour Furrows

suitable rotation or, better still, a system of contour banking in conjunction with a crop rotation.

In such a case as above (i.e., where continuous cropping with the one crop has been carried on) a suitable rotation (and one that is being widely adopted on the Southern

Tableland) is to sow 3 to 4 lb. of midseason subterranean clover seed per acre and I cwt. superphosphate with the last oat crop, using the oats as a cover crop. The clover, top-dressed in the autumn of each year with I cwt. superphosphate per acre, will in five to six years bring the soil fertility back to a stage when a heavy crop of oats can be taken off the land without any fear of crosion.

The subterranean clover seeds so freely that the ploughing up of the sward and sowing down to an oat crop for one or two years does not interfere with the subsequent re-establishment of the clover sward—no re-seeding is required.

A rotation that is coming into favour on land that has not been overcropped is oats for one or two years, followed by subterranean clover (and superphosphate) for two or three years.

Another rotation which is being used in the more favoured localities, such as Roberston, Mittagong, Exeter, Crookwell, Braidwood, Bombala and Delegate is Italian rye grass, 8-10 lb. and red clover 3-4 lb. per acre, followed by oats or potatoes. The rye grass and clover provides excellent feed for two to three years, after which the clover provides a good green manure crop.

In the Crookwell district a rotation being used with great success in checking erosion is as follows:—Subterranean clover (two to three years), potatoes (one year), oats (one year)

#### Britain's Amateur Gardeners Dig for Victory.

BRITAIN'S amateur gardeners are responding to the "Dig for Victory" drive by growing on their 1,000,000 garden allotments vegetables to the value of £20,000,000 a year. In addition, hundreds of tons of vegetables are being grown on railway embankments throughout the country. The Southern Railway alone have 13,000 allotments covering an area of 600 acres.

Even densely populated London has found room for over 38,000 allotments, while in the famous parks of the Metropolis an additional 350 acres are being farmed for food crops and 600 acres set aside for sheep grazing.

London's railwaymen are cultivating 2,700 of these allotments, covering 100

acres, while other workers of the London Passenger Transport Board have dug up 36 acres from which they hope to get 400 tons of potatoes. They are also working 120 acres of market garden land at London's chief bus depot.

Altogether apart from this, the London County Council is now farming 4.000 acres in the City's Green Belt, and to-day the citizens of London own 15,000 head of pedigree cattle, 3,000 pigs, 7,000 head of poultry and 550 sheep.

Last year the city's farms had a record production of 360,000 eggs, 550,000 gallons of milk, 351 tons of meal, 1,668 tons of vegetables and 81 tons of fruit.

## Pastures and Superphosphate Shortage.

#### How Best to Use Available Fertiliser.

A. W. S. Moodie, H.D.A., H.D.D., Senior Agrostologist.

MANY farmers and graziers are apprehensive lest their work in establishing pastures over a number of years will be entirely lost because of the restrictions placed on supplies of superphosphate. Should the restrictions continue for a number of years, there would be a steady decline in carrying capacity and adjustments in stock numbers would be necessary, but in general it may be said that most old pastures will persist for a considerable time, and clovers such as subterranean and white will persist almost indefinitely unless heavily overgrazed. Their persistence thus guarantees a rapid recovery when regular top-dressings can be resumed.

In designing the pasture improvement programme for 1942, full consideration must be given to the present restrictions and future uncertainty regarding supplies. It must be realised that this fertiliser is essential to the establishment and continued existence of pastures.

#### New Sowings Require Superphosphate.

The only pastures that can be maintained at a high level of production without regular applications of superphosphate are those on soils of extremely high natural fertility. In all other cases fertiliser must be used regularly. Experiments carried out by the Department have proved conclusively that superphosphate exerts a determining influence upon the vigour and nature of a newly-sown sward. To sow grasses and clovers without this fertiliser means a poor, thin sward lacking vigour, liable to weed invasion and one not likely to persist and give high production. Bearing these facts in mind, it is obvious that new sowings should not be attempted unless superphosphate is available for use at sowing, or the soil is of very high fertility.

#### Look a Year Ahead.

To newly sown pastures, and particularly pure cultures of subterranean or other clovers, the second year is critical. All such pastures should receive a top-dressing of superphosphate in the autumn following seeding, after which a season may be missed. Sowings in 1942 should, therefore, be restricted to areas for which fertiliser is not only available for use at sowing but

for which there is a reasonable prospect of obtaining further supplies in 1943.

In the case of properties where sowings were made in 1941 and for some years previously, the soundest procedure is to consolidate this work by concentrating the available superphosphate on these areas rather than to embark on fresh ventures. This year is critical for pastures sown in 1941 and these should receive first preference. A further application this year will in most cases ensure the permanency of the species sown, although high production may not be reached if further supplies are not available for a few years.

#### Old Stands Less Adversely Affected.

Old pastures which have been top-dressed regularly for a number of years and where soil fertility has been increased considerably may be omitted from the programme this year; they would still persist though denied superphosphate for some years. Production would decline gradually, but in the meantime the 1941 sown pastures would be well established and future allocations of fertiliser could be distributed at lower rates designed to maintain both old and new areas.

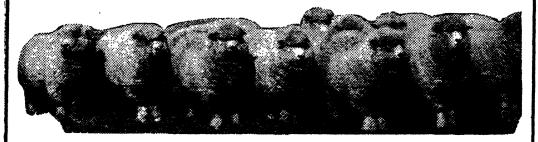
Landowners need not be concerned unduly should a position be reached where no superphosphate is available for old stands of subterranean clover. Naturally, production will diminish and the loss of winter feed may cause embarrassment, but the clover will persist indefinitely and will reach high production again as soon as regular

(Continued on page 152.)

## RESULTS Compared with Costs

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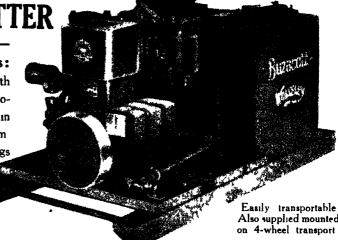
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#### Nicotine Poisoning in Sheep.

#### Tannic Acid an Effective Antidote.

L. HART, B.V.Sc., H.D.A., Veterinary Research Station, Glenfield.

LOSSES from nicotine poisoning are reported from time to time, following the use of nicotine sulphate (Blackleaf 40) as a drench for worms in sheep. If symptoms of poisoning develop shortly after drenching, the sheep should be given a small dose of 5 per cent. bluestone solution, followed by one ounce of 5 per cent. tannic acid solution. The tannic acid should be freshly prepared.

Nicotine sulphate solution is widely used as an anthelmintic for sheep. It must be remembered, however, that this drug is a poison, and when overdoses are given, or where the sheep dosed are weak or starving, deaths are likely to occur. In these cases symptoms usually develop within a few minutes, and consist of staggering gait, rapid respiration leading quickly to complete prostration, the animal being unable to rise, and dying within an hour.

#### Effect of Tannic Acid.

When nicotine sulphate is mixed with tannic acid a precipitate, which almost certainly is nicotine tannate, is formed. This is a loose combination, which when inside the sheep slowly breaks down, releasing the nicotine sulphate. Advantage has been taken of this reaction to develop an antidote for nicotine sulphate poisoning in sheep.

It was found that between 4.0 ml. and 80 ml. of nicotine sulphate (Blackleaf 40) were required to kill a healthy strong sheep of 90 lb., when given by mouth, and in testing the antidotal effect of tannic acid the nicotine sulphate was given at the rate of 1 ml. for each 11 lb. body weight. This is approximately eight times the amount contained in the medicinal dose. Further, 20 per cent. tannic acid solution, when mixed with equal parts of Blackleaf 40, precipitated the latter. In order to ensure the antidotal effect, four volumes of 20 per cent. tannic acid solution were given for each volume of Blackleaf 40.

When sheep were given the lethal dose of Blackleaf 40, and the tannic acid solution was given as soon as symptoms appeared, they recovered. Sheep drenched with the lethal dose of Blackleaf 40 to which the

antidotal amount of tannic acid solution had been added before administration, showed no symptoms. In order to increase the chance of drenches (both Blackleaf 40 and tannic acid solution) reaching the abomasum (fourth stomach) direct, a small amount of 5 per cent. bluestone solution was given by mouth before each drench.

#### Influence on Efficiency of Drench.

A small experiment was carried out in which the effect on worm infestation of the addition of tannic acid to the ordinary bluestone nicotine sulphate drench before administration was tested. Owing to the nature of the drench, the dose had to be given by means of a drenching bottle. Although the numbers employed were too small to allow definite conclusions to be drawn, the tannic acid did not appear to interfere with the anthelmintic efficiency of the nicotine sulphate.

#### To Administer the Antidote.

Thus it is recommended that if symptoms of nicotine poisoning develop shortly after drenching, 1 ounce of 5 per cent. tannic acid solution should be given by mouth after a small dose of 5 per cent. bluestone solution. The tannic acid solution should be freshly prepared.

It is possible that, in an emergency, if tannic acid is not available, 3 or 4 ounces of strong tea would have a similar effect.

When it is intended to drench very young or poor sheep with the nicotine bluestone mixture, it would be a wise precaution to have a supply of tannic acid available so that treatment of any sheep showing symptoms of poisoning could be given at once. Treatment must be given as soon as symptoms are shown.

#### RESEARCH BENEFITS THE DAIRY FARMER.

#### MASTITIS AND CONTAGIOUS ABORTION.

## Apply Present Knowledge and Reduce Losses.

D. F. STEWART, B.V.Sc., Dip. Bact., Senior Pasture Protection Boards' Research Officer.\*

WHILE the final answers to the problems of bovine mastitis and contagious abortion are not yet known, sufficient understanding has been obtained to minimise the economic loss caused by them.

#### Two Main Types of Mastitis.

From the examination of many thousands of milk samples at the Veterinary Research Station. Glenfield, we know that there are two main types While the most spectacular form is of mastitis. that caused by organisms known as staphylococci, it is responsible for only about 10 per cent. of all cases of mastitis throughout the State. This type usually consists of a sudden swelling of the udder accompanied by immediate cessation of milk supply. Although this kind of mastitis might occasionally be severe enough to cause the death of an affected cow, it has been found that the majority of affected quarters will return to normal functioning when the cow calves again. The return to normal can be assisted greatly by frequent stripping, massage and hot fomentations. This type of mastitis is more common under dry, dusty conditions, and it is not surprising to find an increase in the number of cases during drought.

#### Commonest Form of Mastitis.

The most common form of the disease is that associated with an organism known as Streptococcus agalactiae. Infection of the udder with this organism can produce a range of symptoms varying from very acute inflammation with immediate cessation of milk supply to a progressive hardening of the udder tissue not necessarily accompanied by altered milk. Again some cows can carry this organism for short or long periods and, although they exhibit neither symptoms nor signs of its infection, they are a potential menace to other cows.

#### Susceptibility of Cows Varies.

From the investigational work at Glenfield, evidence is accumulating that the factor which determines the degree and result of an infection of the udder is the innate resistance of the individual cow to udder infection. In other words, the resistance of each cow to infection of the udder will determine whether that cow will be free of infection, or whether it will be lightly infected, or whether it will develop into a had case ending in the loss of one or more quarters. This has been most striking in our main experi-

mental herd, and it has been possible to divide the cows into "resistant," "intermediate" and "susceptible" classes. Cows of the "resistant" class, ranging from animals in their eighth lactations have never shown a detectable degree of infection, while cows of the "susceptible" class and of comparable ages are constantly becoming infected either with Streptococcus agalactiae or staphylococci. Cows of the "intermediate" class have had a light infection which has been successfully cradicated and have remained free subsequently.

#### Cull Badly Affected Cows.

The most important feature of this classification is that, as far as the investigations have progressed in the experimental herd, no daughter of a member of the "resistant" class has yet shown infection. This finding would suggest that daughters of cows which have never shown mastitis would be less likely to be susceptible to mastitis than daughters of cows which have suffered bad attacks of the disease. It is hoped to expand our investigations along these lines in the future.

Although this aspect must yet be worked out more fully, there are steps which can now be applied confidently to limit the effects of the disease. First amongst these is to cull as soon as practicable any badly affected cows which act as a reservoir of infection and are not economical units of the herd. It is essential to maintain a high degree of hygiene in the dairy, and any cow giving abnormal milk should be milked last. Care should be taken to disinfect cows' teats both before and after milking, and the milkers' hands should be carefully disinfected between milking each cow. It has been found that the most efficient disinfectants for this purpose are those of the chlorine type.

#### Flies-Udder Injuries.

Flies have recently been suspected of transmitting the disease, and while it is difficult to control the fly population on a dairy farm, a high standard of sanitation should be practised. One of the main causes of excessive fly population in dairies is the proximity of piggeries, and consequently the two should be kept as far apart as possible.

Summary of an address given by Mr. Stewart to branches of the P.P.U.

Overcrowding cows into the holding yards increases the chances of contact and also the risk of injury. Prevent udder injuries by careful milking at regular intervals and by running milking machines at as low a pressure as possible Dehorning is of great benefit in the prevention of injuries to the udder.

#### Treatment for Mastitis.

Cows suffering from the disease can be treated with a substance known as entozon. Made up in a solution of 1/1250 this material is infused at body temperature into the udders of infected cows in milk either by gravity or by means of a hand pump. Clean rain water is quite suitable for making the solution, but care must be exercised to ensure sterility of the teat siphons and simple aseptic precautions must be employed. The teat siphon should be boiled for at least ten minutes prior to use, and then not allowed to contact any contaminating material before being inserted into the teat. The tip of the teat must be cleaned and then wiped with a disinfectant or methylated spirits before insertion of the siphon. Milking cows are first stripped out and then the teat sinus flushed out by infusing a small amount of the solution, which is immediately milked out. Then the siphon is re-inserted and the quarter filled to a tensity approximating that which exists just prior to milking. The entozon is allowed to remain in the udder for seven minutes, but any longer period is liable to send the cow dry. The udder is then thoroughly stripped out and the stripping should be repeated at frequent intervals for a period of twenty-four This form of treatment repeated three times at intervals of one week gives success in about 70 per cent. of slight and moderate cases. Where the case is advanced and little milk available from the quarter, the entozon should be used in a strength of 1/500 and allowed to remain in the udder twenty-four hours before being stripped out. This procedure will dry the quarter off completely and will eradicate the causal organism from the quarter. Thus the potential danger of a badly infected quarter to the remainder of the herd is removed and many of such quarters will return to normal at the next lactation period.

#### Contagious Abortion.

Contagious abortion is an infectious disease of cattle and is caused by an organism known as Brucella abortus. The disease is responsible for most but not all abortions which occur in dairy cattle and its presence should always be suspected where several abortions occur.

In the infected cow the organism locates itself in the pregnant uterus or womb and in the udder. In the infected bull the organism is located in the testicles and in accessory sex organs. Infected cows usually abort during the fifth to eighth month of pregnancy, depending on the time infection took place. However, first-calf heifers have been known to abort earlier than the fifth month. Subsequent to the act of abortion the organism disappears from the womb in four to six weeks, but remains in the udder. When the cow becomes pregnant again the organism usually, though not always, establishes itself again in the womb,

although the cow may or may not abort again. However, the loss occasioned by the disease does not lie solely in the loss of one calf, as the infected cow becomes more and more difficult to breed and frequently becomes sterile. One of the most scrious aspects of the disease is the frequency of retention of the after-birth in infected cows. The presence of this disease should always be suspected when trouble of this kind is experienced.

#### Bull Rarely Transmits the Disease.

The infected bull rarely if ever directly transmits the disease to other cows, but might do so mechanically if he serves an infected cow within a month after abortion and soon after serves a clean cow. In the past this point has been one of some contention, but it has been clarified by the work done at Glenfield. The disease is spread by contamination of pastures during the act of abortion or from subsequent discharges. Again many infected cows in subsequent pregnancies will slip their calves a few days before time, and in these cases the organisms are also spread upon the pastures. Healthy cattle grazing over these contaminated areas will become infected. In the course of the investigation on this disease at Glenfield it has been found that the causal organisms will survive for one month on pasture exposed to normal summer weather conditions and for three months during the winter. Consequently if the area where a cow has aborted can be located it should be fenced off quickly or grubbed off and treated with a very strong disinfectant.

It should be mentioned that this organism is secreted in the milk of infected cows and it can infect humans. The disease in humans is a distressing one, though not usually fatal, causing intermittent periods of fever with marked lethargy and is called undulant fever.

#### A Very Reliable Test.

The presence of the disease is diagnosed by a laboratory test, known as the agglutination test, conducted on the blood serum. This test is very reliable and the only time when an infected animal might not react to it is when the test is made within a week of infection. Therefore, it is imperative to conduct two tests at an interval of thirty days before considering any animal free from the disease.

The calf of an infected dam starts life virtually as a fresh entity. The investigations at Glenfield have shown that a calf's body might harbour the Brucella organisms at birth and for as long as it is fed with milk from an infected cow secreting the organisms. However, it loses both the organisms and any agglutination reaction it might have acquired within about three months of being weaned. Consequently by use of the test it is possible to cradicate the disease and build up a fresh herd from calves, provided suitable methods of isolation are taken. Such a scheme should always be conducted under veterinary supervision It must be remembered that a clean herd is very susceptible to the disease, and that the most common source of introduction is the beast bought in the public saleyard.

Horses can become infected and must be considered in any scheme of eradication. In infected mares the disease follows a similar course to that in cows. Some cases of fistulous withers in horses are due to infection with this organism.

#### U.S.A. Experimenting with Special Vaccine.

A recent advance in the U.S.A. has been the development of a special vaccine derived from a strain of this organism of reduced disease producing powers. The vaccine is used on calves up

to six months of age, and at present a very largescale experiment is being conducted in the U.S.A. In any case, for ultimate control, should the vaccine prove successful, it will still have to be used in combination with the agglutination test. However, much time will have to elapse before the true value of this vaccine can be assessed. Work on this aspect is proceeding at the Veterinary Research Station, Glenfield, but it is as well to state that dead vaccines are quite useless in the control of the disease and live vaccines are prohibited by law in this State.

#### To Destroy Anthrax Carcases.

CARCASES sprayed with crude oil (or sump oil if available) will burn readily and completely. This is a cheaper, quicker and less laborious method of destroying diseased carcases than the common practice of using wood fire Furthermore, the risk of starting bush or grass fires is reduced.

Recently the Acting District Veterinary Officer in the west observed this new method being used with very satisfactory results for the destruction of anthrax carcases. In this particular case forty-two carcases were destroyed by the use of about 12 gallons of crude oil, which costs 1s. per gallon.

H<sub>15</sub> description of the method used is as follows:—

The equipment used is an ordinary pitchfork, kerosene tin and an ordinary stirrup pump

The carcase is sprayed with a small amount (about a third to half a gallon) of crude oil and ignited, after previously saturating surrounding areas with water. A spare tin of water is also held in case the fire should get out of control. The heat generated by the burning carcase saturated with oil is very great. The first shoot of flames subsides after five minutes or so, and then a further spraying is carried out with a small amount of crude oil. With the aid of a pitchfork the carcase is turned about so

that it comes totally into contact with the fire Loose bits of wool from the carcase should be scraped up and placed on the fire

The carcase is completely cremated within twenty minutes, nothing being left but a greyish bone ash. The fire continues to burn for some considerable time, however, after the carcase has been reduced to ash, but the usual method employed by the owner is to douche the fire with water after it has been burning for half an hour or so, as by that time there could be no chance that any viable organisms exist

This method of carcase destruction has several advantages. The cost is relatively inexpensive and works out at slightly over 3d per carcase. Labour is reduced to a minimum and the difficulty in procuring timber is overcome. The fire can be kept under much closer control than a wood fire, the total area involved in the destruction of a sheep's carcase being about 2 square yards.

There appears little doubt that this method could also be used for the destruction of cattle carcases, as it would seem that the crude oil is sufficient to generate enough heat to cause the carcase to burn without the addition of further fuel. A more economical method would be the use of sump oil in place of crude oil, and even in these times supplies of sump oil should be readily available

#### Varieties of Approved Seed Available.

In order that furmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:—

W'hcat —

Bencubbin, Ford, Gular, Koala, Totadgin

Tomatoes-

Australian Earliana, Bonny Best, Improved Walker's Recruit, Red Marhio, Salad's Special.

Cauliflowers—
Hawkesbury Solid White, Nugget, Shorts.

Hunter River Brown, Maitland White.

Pumpkins--

Queensland Blue.

Beans-

Tweed Wonder, Brown Beauty.

Sorghum-

White African, Saccaline, Jones. Japanese Millet-

Grasses, etc.-

Phalaris tuberosa. Subterranean Clover (midseason), Sudan Grass, Lucerne.

#### Are You in a War Savings Certificate Group?

#### Tubercle-free Herds.

I'me following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address,	Number Tested.		Owner and Address.	Number Tested.	Expiry Date.
		1942.			1942.
Department of Education, Yanco Agricultura	}	-54	Peel River Land and Mineral Co., Tamworth		
High School	50	ı Mar	(Beef Shorthorns)	16	8 Aug
Riverina Welfare Farm, Yanco	المقا	I	C. I. Fairbairn, Woomargama	210	26 Sept
Vallah Pastoral Co., "Wallah," Narrabri	84	4 ,,	F. and C. Ryall, 5 Western Avenue, West		Do Dipi
. E. Liggins, "St. Leger Dairy," Kuring-gai		7 "	Wollongong	57	I Oct.
Chase Road, Turramurra North	45	6	W. J. Stephenson, "Hill View," Fig Tree	23	
Frangie Experiment Farm, Trangie	94	7 .	W. C. Wyatt, Sherwood Road, Merrylands	29	"
Berry Training Farm, Berry	881	Ź., i	Ehsman Bros., Inverell	25	"
orster and Sons, Abington, Armidale (Jerseys)	58	5 "	Hawkesbury Agricultural College, Richmond	-3	17 ,,
. I. Toobey, "Mandemar," Berrima	56			128	18
I. L. Forster, Abington, Armidale (Aberdeen	30	8 ,,	(Jerseys)		
Angus)	182	8	Lunacy Department, Gladesville Mental	65	31 ,,
A D C.b Afb D	51		* ************************************		14 Nov
Sarnardo Farm School, Moworay Park	98		Bathurst Experiment Farm (Ayrshires)	22	. ف
The William Thompson Masonic School,		13 ,,	W. W. Martin, "Narooma," Urana Road,	21	18 "
Baulkham Hills					
T. Reid, "Narrangullen," Yass	51	14 ,	Wagga	150	29 ,,
	169	15 ,	A. G. Wilson, Exeter (Jerseys)	68	29 "
liss N. C. Brenan, Arrankamp, Bowrai		15 "			
Vagga Experiment Farm (Jerseys)		16 ,,	Lunacy Department, Parramatta Mental		1943.
. Witton, Bligh Street, Muswellbrook		19 ,,	Hospital	31	6 Feb
mu Plains Prison Farm	110	19 ,,	The Sydney Church of England Grammar		
Department of Education, Brush Farm, East-			School, Moss Vale	55	6 ,,
wood	7	20 ,,	Tudor House School, Moss Vale	17	6 ,,
C. O'Dea, Perry Street, Dundas	23	20 ,,	Koyong School, Moss Vale	2	6 ,,
i. M. Edwards, Uralla	5	22 ,. ,	New England Girls' Grammar School, Armidale	25	6 ,,
3. N. Coote, Auburn Vale Road, Inverell	30	22 ,,	A. E. Stace, Taylor Street, Armidale	31	7 ,,
I. East, Gum Flat Road, Inverell	41	22 ,,	New England University College, Armidale	13	1 Mar
t. Ignatius College, Hunter's Hill	21	27 ,,	Lunacy Department, Morisset Mental Hospital	80	25
V. Boland, "Seaton," Inverell	14	28 ,,	R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	3 Apı
unacy Department, Callan Park Mental		(	Liverpool State Hospital and Home	102	10 ,,
Hospital	28	29 ,,	H. F. White, Bald Blair, Guyra (Aberdeen		,,
E. D. Hordern, Cobramatta (A I.S.)	97	29 ,,	Angus)	137	26 ,,
imond Bros., Morisset		30 ,.	F. C. Harcombe, Hillcrest Farm, Warialda	-3,	,,
t. Michael's Orphanage, Baulkham Hills		31 "	Road, Invereil	32	15 May
arm Home for Boys, Mittagong	56	18 April.		32	15 ,,
. H. Newman, "Bunnigalore," Belanglo, via	.,•	10 10 10 10 10 10 10 10 10 10 10 10 10 1	Sir F. H. Stewart, Dundas	6	30
Sutton Forest	19	15 May.	Cowra Experiment Farm	41	27 Jun
arrer Memorial Agricultural High School,		23 24207.	Trading District Co. 4 Problem D.C. 1.		ro July
Nemingha	27	17 ,,	W. Budden, "Hunter View," Kayuga Road,	314	-0 1419
. Brownlaw, Gol Gol	34	26 ,,		18	5 Aug
ew England Experiment Farm, Glen Innes	34	,	W. Williams, Dunreath, Inverell	32	
(Jerseys)	64	27 "	Navua Ltd., Grose Wold, via Richmond	32	29 "
	ا خا	13 June	(Tersevs)	***	4 Sept
w eart 44 th 3th t 18 th			Australian Missionary College, Cooranbong	113	· ·
	1 1	20 ,,	Department of Education Conford Room	113	δ,,
D. I talet, Inverell	104	23,	Department of Education, Gosford Farm	1	
unacy Department, Rydalmere Mental			Home	40	29 ,,
Hospital	48	27 ,,		46	13 Oct.
. J. Wilks, "Oaks Farm," Muswellbrook	45		Lunacy Department, Kenmore Mental Hospital		5 Nov
V. S. Grant, Braidwood		14 July.	Wollongbar Experiment Farm	112	4 Dec
, Hannaford	24		State Penitentiary, Long Bay	10	9 ,,
t. Vincent's Boys' Home, Westmead	19	19 ,,		!	1944
Iuristone Agricultural High School, Glenfield	33	26 ,.	St. Ignatius College, Riverview .	25	27 Jan.
V. Turnbull, "Riverview," Muswellbrook	66	5 Aug 1	i		

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
MAX HENRY, Chief of Division of Animal Industry.

Don't let rumours or secrets get any further than you.

## Brucellosis-free Herd Scheme (Swine). List of Accredited Herds.

THE following is a list of the names and addresses of ewners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Allard, S. R., Cleobury Stud, Werombie Road, via Camden. Bathurst Experiment Farm, Bathurst.
Chapman, G. E. and Son, "Illabo Park," Alectown. Cooks, F. D., "Condalarra," Goologong.
Cowra Experiment Farm, Cowra.
Croft, F., Lugwardine, Kentucky.
Draper, R. E., "Glengar," Capertee.
Eade, E. M., "Bade Vale," Euchareena.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Garrard and Price, Boorie Stud, Nimbin Road, Lismore.
Genge, J. 1., "Springfield," Eugowra.
Grafton Experiment Farm, Grafton
Graham, E. H. Kinilabah Stud, Wagga
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College, Richmond.
Hennessey, J., Pacific Stud Piggery, Holgate.

Holland, A. L. Argonne, Tubbul.
Liverpool State Hospital and Home, Liverpool.
Maybin, N. C., Towac, Orange.
Macarthur (John) Memorial Agricultural High School, Glenfield.
McCaughey Memorial Agricultural High School, Yanco.
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverna Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F., "Camelot," Penrith.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud" Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange
Williams, G. R. B., "Gwandalan," Grenfell,
Wilson, A. G., Blytheswood Exeter.
Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp, Mannus.
Callan Park Mental Hospital, Callar Park, Rozelle.
Croft, H. M., "Salisbury Court." Uralla
Emu Plains Prison Farm, Emu Plains.
Glen Innes Prison Camp, Gien Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.
Masters and Upston, Whitmore Stud Farm, Wamberal, via
Gosford.

Morisset Mental Hospital, Morisset,
Oberon Prison (amp, Oberon,
Orange Mental Hospital, Orange,
Parramatta Gaol, Parramatta,
Parramatta Mental Hospital, Parramatta,
Peat and Milson Islands Mental Hospital, Hawkesbury River,
Pollak, V., Marata, Harrow Road, Glenfield
Punnett, R. S., Brawlin,
Smith, C. W. J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

## Nitrogen Fertiliser Shortage and Irrigated Crops.

THE shortage of nitrogenous fertilisers makes it necessary that farmers, fruit growers and vegetable growers should use all possible means at their disposal to maintain the nitrogen and humus supplies of the soil.

On the Murrumbidgee Irrigation Areas and on properties where irrigation is available, much can be done by the use of leguminous cover and green manure crops, and the following recommendations made by the Irrigation Research Committee will be of interest.

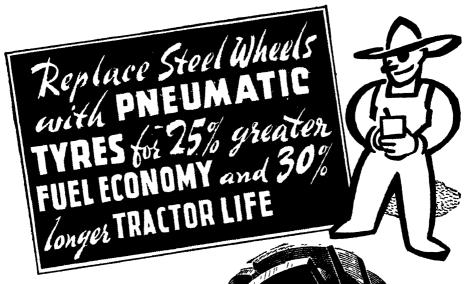
For Orchards and Vincyards.—Use tick beans, field peas, subterranean clover or crimson clover as green manure crops to be ploughed in—or lucerne, which should be moved and allowed to decay.

For Vegetables.—Precede every crop with either:—

- 1. Summer fallow.
- 2. A good green manure crop of tick beans or cowpeas.
- 3. A dressing of farmyard manure, sheep manure or compost.

For Large-area Farms.—Where field crops are grown, introduce a leguminous plant into the rotation to be fed off or harvested. Suitable plants are clovers, vetches and cowpeas for feed, and green peas, navy beans and soybeans for harvesting—or introduce a summer fallow into the rotation.

In all cases conserve all farmyard manure; less nitrogen is lost by feeding on the land than by feeding off the land and carting the manure on to the land.



The Goodyear Sure-Grip Tractor Tyre, because of its self-cleaning ability and the deep "bite" of its hefty lug bars, achieves the traction that saves a good 25% of fuel.

Also, a tractor fitted with a gas producer unit operates better on Goodyear pneumatics than on steel wheels. Again, the cushioning for engine and chassis provided by the smooth-rolling pneumatics gives the tractor 30% longer life. No mudpockets to fill up. This tread is absolutely SELF-CLEANING.

Each lug is the same size—and even-spaced. So each lug grips the same—no jerks to start spinning.

And, each lug bar is WIDER at the base than the top—built like a dam—to stand years of hard pulling with no danger of tearing off.





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- Riverstone Meat Co. Pty. Ltd., 5 O'Connell Street, Sydney.
- e Redbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- e W. Angliss & Co. (Aust.) Pty. Ltd., 42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Creek, Bookhampton.



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#### Superphysphate Shortage on Dairy Farms

## Make Better Use of Farmyard Manure.

A. W. S. MOODIE, H.D.A., H.D.D., Senior Agrostologist.

IN view of the restrictions placed on the use of superphosphate and the uncertainty regarding future supplies, dairy farmers would be well advised to pay special attention to the conservation and use of farmyard manure. In this respect they are in a more fortunate position than wheatgrowers who are compelled to use mineral fertilisers.

The principal objection to the use of farmyard manure will no doubt be the labour involved in collecting and distributing, in view of the acute shortage of labour in every district. When various aspects of the problems associated with the food supply of a dairy herd are considered it may be tound that other factors will perhaps more than compensate for labour expended in this work.

It can be assumed that every farmer is desirous of maintaining production at a high level. To do so he must provide adequate food, and unless highly improved pastures are available it is certain that production cannot be maintained during the winter months without grazing crops. Such crops are a decided advantage in any case to supplement the pastures and for conservation as silage or hay.

#### To Off-set Labour Requirements.

By utilising farmyard manure and obtaining high acre yields it will be possible to reduce the total area sown for this purpose, thus offsetting the labour required to plough and cultivate large areas. The low fertility conditions characteristic of large areas of

dairying country are responsible for the wastage of many labour hours in preparing large areas for low yielding fodder crops. The use of farmyard manure would permit the total area under fodder crops to be reduced considerably without any loss in total production. In addition to the advantage of higher acre yields under normal conditions, the ability of farmyard manure to increase the capacity of the soil to absorb and retain moisture provides an assurance of reasonable yields should dry conditions prevail.

#### Requires No Special Treatment.

Farmyard manure need be given no special treatment prior to use. It may be collected from bails, stalls and grazing areas, deposited where required and immediately ploughed under. Losses of mineral and other ingredients are reduced to a minimum by adopting this method.

The production of grass paddocks may also be increased by the use of animal manure in the form of heavy applications to selected paddocks, by practising night grazing on small areas then using grass harrows, and by using harrows on the grazing paddocks generally.

#### Give Books and Magazines to Fighting Forces.

An appeal is made to readers to donate spare books and magazines to the N.S.W. Camp Library Service for distribution to men of the fighting forces. It is unnecessary to stress how much an adequate supply of reading matter is appreciated by men at their battle stations, particularly those at isolated posts.

Receival depots for books and magazines are being established in many country centres, and will be indicated by display of the official "Give Them Books" poster. Watch out for this poster in your district and leave your donations there, or send the material to the Camp Library Service, c.o. the N.S.W. Public Library, Macquarie-st., Sydney.

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### Approved Seed.

### March, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied regarding it to inquirers.

И'heat.

Bencubbin-Manager, Experiment Farm, Trangie. (5s. 6d. bushel, f.o.r.)

Ford-Manager, Experiment Farm, Condobolin

(5s. 6d. bushel, f.o.r.) Gular-Manager, Experiment Farm, Trangie (5s. 6d bushel, f.o.r.)

Koala-Manager, Experiment Condobolin. (5s. 6d. bushel, f.o.r)

Totadgin-Manager, Experiment Farm, Tran-gie. (5s. 6d. bushel, f.or.)

Oats

Belar-Manager, Experiment Farm, Trangie. (4s. 6d bushel, for.)

Buddah-Manager, Experiment Farm, Trangie. (4s. 6d. bushel, f o.r.)

Gidgee - Manager, Experiment Farm, Trangie. (4s. 6d. bushel, f o.r.)

Mulga- Manager, Experiment Farm, Trangie (48. (4. bushel, f.o.r.)

Beetroot.

Early Wonder-A. Yates & Co., 184 Sussex-

street. Sydney. Early Wond r -Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Detroit Dark Red-A. Yates & Co., 184 Sussex street, Sydney.

Improved Detroit Dark Red -Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Sweet Corn. Golden Bantam-Principal, H.A. College, Richmond.

Lettucc.

Imperial 847-Runseys Seeds Pty. Ltd., 331 Church-street, Parramatta

Imperial 847 -- A. Yates & Co., 184-186 Sussexstreet, Sydney.

Imperial 615-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Imperial 615-A Yates & Co., 184-186 Sussexstreet, Sydney.

Cauliflower.

Shorts—H. G. Crew, Nullenroo, Gresford. Shorts—H. Burton Bradley, Sherwood Farm. Moorland.

Superior "K" (Selected Snowball)—Rumseys Seeds Pty. Ltd., 331 Church-street, Parra-

Hawkesbury Solid White-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

E. A. Sharp, 110 Gordon-avenue, Hamilton. Phenomenal Maincrop-A. Yates & Co., 184 Sussex-street, Sydney.

Phenomenal Five Months-A. Yates & Co.,

184 Sussex-street, Sydney. E. A. Sharp, 110 Gordon-avenue, Hamilton. Yates Phenomenal Early-A Yates & Co., 184-186 Sussex-street, Sydney.

Onions

Hunter River Early Brown-R. C. Morandini, Box 74, Dubbo. Yates & Co., 184-186 Sussex street.

Sydney.

Hunter River Early White -R C Morandini, Box 74, Dubbo.

Odourless-Sam Anthony & Son, High-street. Hillston.

White Imperial Spanish Sam Anthony & Son, High-street, Hillston

Cabbaye.

Succession—A. Vates & Co., 184-186 Sussexstreet, Sydney.

Yates Early Drumhead -- A. Yates & Co., 184-186 Sussex-street, Sydney.

Parsnips |

Hollow Crown-A Yates & Co., 184-186 Sussex-street, Sydney.

Rhubarb.

Sydney Winter-Rumscys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Sorghum.

White African -- Manager, Experiment Farm, Grafton.

Saccaline—Principal, H.A. College, Richmond. Jones-Manager, Experiment Farm, Wollong-bar. (3d. per lb.).

Tomatoes.

Bonny Best-Manager, Experiment Farm. Bathurst (4s. oz. posted).

Marvana-Rumseys Seeds Pty. Ltd.. 331 Church-street, Parramatta.

Break-o'-Day-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Australian Earliana—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Velvet Beans.

Manager, Experiment Farm, Grafton.

Broom Millet.

Manager, Experiment Farm, Bathurst.

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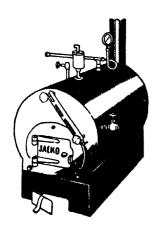
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Budding and Grafting Wood of Apples and Pears.

The Need for Care in Selection.

H. Broadfoot, Chief Fruit Instructor, and E. C. WHITTAKER, Fruit Instructor. THE selection of budding and grafting wood of apple and pear trees is a matter that merits more attention by all nurserymen and growers, since the former propagate practically all trees purchased by growers for planting out, and growers frequently top work established trees to more profitable varieties.

Much has been written and said about the effect of the use of certain fruit trees having the best characteristics in respect to growth, cropping, quality of fruit, etc. At the present time, however, many growers and nurserymen do not believe in selected trees, and so far as our present knowledge goes, they may be correct up to a point, for thousands of trees in any variety, such as Granny Smith and Jonathan apples and Packham's Triumph pears, etc., each of which originally developed from one seed, are morphologically one individual; the plant structures of each variety are similar.

#### Influence of Location and Stock.

There are, however, in some orchards, variations in a given variety which has been propagated originally from a seed (such as Jonathan and Granny Smith), whilst the difference in some commercial varieties when planted out in different districts is very wide and affects alike, the fruit of all trees of that variety. As an example, Jonathan, produced in the Batlow district, is exceptionally good, both in regard to

colour, shape and the fruit is of excellent quality, whilst Jonathan produced on the Murrumbidgee Irrigation Area is of poor shape, poor flavour and poor keeping quality. Granny Smith produced on the Area, however, is a good commercial apple. Similar instances could be quoted in regard to other commercial varieties of apples and pears produced in several districts of New South Wales.

There is no doubt that various factors exist by which we can "bend" a variety, and certain characteristics can be brought out or made to disappear in the variety. Two main factors which exist in respect of this in New South Wales are district and stocks. The factor of district, an instance of which is given above, is well known to all growers and fruit merchants in this State.

In respect of stocks, it might be briefly stated that, from extensive experiments carried out by this Department, a given variety or varieties of apples and pears may be "swayed" if worked upon certain clonal strains or seedling stocks of a given variety. Stocks in some instances have influenced

the scion in respect to: (1) form of tree; (2) early cropping; (3) adaptability of variety to soil; (4) transmission of disease to fruit; (5) size of tree; (6) life of tree, etc., etc.

We have not sufficient information to say that we can permanently alter and fix a variety which was originally raised from seed, by planting it in different localities or working it on different stocks, etc. If the power which alters the variety is taken away, the variety in question will revert to its original self. If scion wood, for instance, is taken from Jonathan trees in the Murrumbidgee Irrigation Area and worked on to trees in the Batlow district, the produce of these trees is totally different to the fruit produced on the Murrumbidgee Irrigation Area, and is similar to the Jonathans produced at Batlow.

Although tests which are being carried out by this Department to date do not reveal anything that would upset this theory, it is possible that as time goes on, some changes of a permanent nature in trees growing in localities producing fruit of an inferior type, like Jonathan on the Murrumbidgee Irrigation Area, may become fixed and continue to produce inferior fruit, even if scions are collected from these trees and worked on to stocks in a suitable locality, such as Batlow. In the meantime, however, growers and nurserymen should select scion wood of any given variety of apple and pear from trees planted in a district which produces the best commercial crops of high grade quality

#### **Bud Sports.**

Bud "sports," however, are an exception to the above rule, and there is not one red or striped commercial variety grown in New South Wales which has not produced one or more sports. How they originate is still a botanical mystery. These sports have more or less been grown commercially in this There can be no sound argument against growing them up to a point. Some of our present-day leading varieties belong to this category. One trouble where there are numerous sports of a leading variety, is that the original has a reputation on the market, and there is a tendency to market all said sports under the old name, with the result there is often confusion of the characteristics of a variety, and in particular the various sports themselves tend to become

completely mixed up. It may happen also that several sports of a particular variety may be very much alike—so much so that an expert knowledge of them would be required to tell one from the other—and whilst an occasional sport may be an acquisition and superior to the original, the greatest number may only be superior in one character and possibly inferior in other characteristics. Therefore, it is obvious that any mixing up of various red sports of a given variety would lead to a lot of confusion, which would not be in the best interests of the fruit-growing industry as a whole.

Let us examine a case in point; one which comes readily to mind is the Rome Beauty apple, with a retinue of at least four red sports—and how many are there amongst us who can tell one of these sports from the other. Yet all of them are being grown to some extent commercially. When marketed, they are often mixed with ordinary Romes and marketed as such, although they are not identical as regards several characteristics, including the very vital one of keeping quality.

Another point to bear in mind in regard to bud sports is that sometimes such a variety will prove unstable as to type, and show a tendency to revert to the original type. This, of course, is a decided disadvantage should the original type be inferior to the sport. Whether or not this is the case with Lalla, a sport of Delicious, it is hard to say, but it is a fact that many trees planted as Lalla in this State (including the best districts), are bearing fruit which is all typical of Delicious. It does not appear likely that a complete reversion of type has taken place, but that a mistake has been made in the selection of scion wood or in the labelling of the trees. There are, however, many individual trees of Lalla which bear fruit, some of which is typical of Lalla, and some typical of Delicious. In this instance there is little doubt that reversion to type has taken place.

With a great increase of sports during the past few years, it is obvious, therefore, that stricter supervision should be given in respect to the selection of propagatory material.

#### Seedlings.

During the past few years quite a number of seedling apple and pear trees have been

raised, some of which have been boosted to such an extent that they have been planted out in commercial areas before the varieties have been properly tried out in the various districts of the State, nor has any work been done in connection with the cool storing of these varieties. Some of the new seedlings resemble a commercial variety, and an example of this may be found in respect to Orleans and Medina, which in some respects resemble the Delicious apple so much that they could be very easily passed off on the public as such, particularly in the case of Orleans. It has, however, been proved that all are inferior to Delicious in respect to flavour, etc., and therefore, it does not require much imagination to grasp what would be likely to happen if, through ignorance or design, these varieties eventually became mixed up amongst plantings of Delicious.

The boosting of new seedling apples without adequate testing and recommendation by the Department and agents, is to be deplored. It must be remembered that it takes at least twenty years to test a variety adequately in regard to its production and storage qualities.

#### Propagatory Material.

The selection of propagatory material from young trees which have not carried fruit is definitely not recommended. Whilst there are many varieties in which differences can easily be noted in respect of habit of growth, leaves, stem, etc., there are others where the differences cannot be seen until the trees commence to crop. It is obvious, therefore, that when propagatory material is selected from young trees, there may be quite a number amongst them that are not true.

It is in the interests of nurserymen, growers, agents and this Department to cooperate more closely and to see that only the best propagatory material is selected from matured trees, true to variety, which are free from insect pests, fungous diseases, virus troubles, and that recommendations for planting certain varieties in stipulated districts should be kept at a minimum.

Work is in progress to produce a new red, early dessert variety for planting in the early-maturing districts, and a red, late maturing variety for planting in the late districts. The latter takes the place of Democrat, which, although it has some desirable characteristics, is not all that could be desired.

#### Apple and Pear Packing Charts.

E. C. WHITTAKFR, Fruit Instructor.

THE accompanying packing charts for apples and pears are recommended for use this season.

It will be noted that, for apples, no alterations of any consequence have been made since the charts were published previously, but that for pears, some adjustments have been made for smaller sizes and types. It is anticipated that these smaller sizes will comprise more than a normal percentage of many crops this season, and the new chart should make for better packing of fruit of sizes round about 2 inches and 2½ inches—much of which, in a normal season, would not be packed for market.

#### Wall Charts Available.

The Department has available a number of wall charts for both apples and pears, and any bona-fide grower or packing shed may have these by making application to the Under-Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

#### Apple Packing Chart for Canadian Standard Case

(18 mches long x 11½ mches wide x 10½ mches decp, made measurements)

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'F" means "Full size" indicating that the bulk of fruit in the case should be of the maximum size allowed in the range 'N" means "Neat size," indicating that the bulk of the fruit should be of the minimum size allowed in the range

#### Pear Packing Chart for Standard Pear Case

(18 inches long x 11 inches wide x 8 inches deep inside measurements)

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#### Pear Packing Chart for Standard Case

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## Fertilisers for Sultanas.

#### Value of Nitrogen Shown in Murray River Trials.

I BOWMAN Ph D B Sc Agr, Fruit Research Officer and 1 ( OIDHAM I ruit Instructor

THE value of nitrogenous fertilisers for sultanas was demonstrated in manurial trials conducted at Goodnight, on the Murray River, from 1933 to 1939. Superphosphate alone did not result in any increase in yield, and potash fertilisers gave a temporary increase—for the first few years only.

Nitrogenous fertilisers did not significantly increase yield of dried fruit, as they reduced the Beaume readings and increased the drying ratios in several seasons, but they never clearly reduced the grade of the fruit.

In 1933 a mannital trial designed to ascert in the effects of mitrogen potash and phosphorus on the yield of sultanas was lo ated it Goodinght on the Murray River on the vineyard of Mr J ( Williams whose cooperation over a long term of years is gratefully acknowledged. The supervision of the experiment was carried out until 1937 by Mr. McCutcheon and later by Mr I ( Oldham

The soil is a typical "red Mirray sand" fairly deep and very open and the vines were planted in 1925. Fertilizers were first applied in the spring of 1933. They were placed in a furiow 18 to 24 inches from the vines, another sod was then turned and an urigation given along this furrow

The minumal treatments, repeated six times were as shown in Table 1 treatments were superimposed upon the usual commercial cultural methods, of which those affecting soil fertility were (a) an annual green manure crop of tick beans receiving I cut superphosphate at seeding, and (b) ploughing under each year's cane Thus, strictly speaking, there was no plot which received no superphosphate, and consequently, it was not possible to discern the influence of phosphorus on yield as it was that of potash and nitrogen.

The experiment was a 6 x 6 "Ratin Square."

#### Yearly Results.

In 1934 the harvesting records were not considered worth taking, because of severe rain damage to the crop.

In 1935 yields of some plots were affected by slight frost and black spot, and, consequently, were not considered of direct value for experimental purposes, although total yields are given in Table 1. The no manure plot showed a Beaumé of 12 deg. and other plots of 11½ deg. All fruit was graded as 3a Cr.

In 1936 large variations of yield started to appear among the treatments. Plots receiving superphosphate only gave low yields; those receiving nitrogen or potash high yields. The nitrogen plots gave a Beaumé of 12½ deg. (sulphate of ammonia) and 12¼ deg. (blood and bone), and all other plots a Beaumé of 13 deg. The drying ratios of both nitrogen plots were high (403 and 4.15 respectively) compared with other plots (3.7 to 3.8). There were large differences in the grading of the dried fruits, as follows:—

No manure and nitrogen plots	3	Cr.
1 lb. superphosphate	4	(`r.
2 lb. superphosphate	4a	Cr.
15 lb. muriate of potash	1a	(r.

TABLE 1. -YIELD OF SUITANAS (FROM 24 VINES UNDER EACH TREATMENT\*)

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<sup>\*</sup> In Ib. fresh fruit and Ib dry fruit (in italics beneath)

In 1937 separate plot yields were not obtained, but the total yields are important, as they show: (a) the continued low yield of all superphosphate plots; (b) first complete ascendancy of the nitrogen plots over all others; and (c) a receding of the yield

of the potash plots. This season's fruit from all treatments was classed as 5 Cr. grade.

In 1938 a statistical analysis of the yields of the separate plots showed that—-

- 1. Sulphate of ammonia gave a significantly higher yield than all other treatments. Blood and bone gave a higher yield than other treatments, except sulphate of ammonia, but not significantly so.
- 2. Fruit from the nitrogen plots were significantly lower in Beaumé readings than that from all other plots.
- 3. There was no significant difference among the treatments in weight of dry fruit produced. Fruit from each plot was not dried separately. Each treatment was bulked and plot yields of dried weights were calculated from the actual drying ratios of each treatment and the individual plot yields of fresh fruit.

The fruit from all treatments was of excellent quality, classed as 5 Cr., the fruit from the nitrogen plots being not quite so good as the remainder and slightly duller in colour. The foliage of the nitrogen plots was observed to be much heavier and darker in colour and it held on the vines longer in the autumn.

In 1039 observations in the field showed a marked difference between nitrogen plots and those not receiving nitrogen. However, heat damaged the harvest and induced such variation that it was not possible to establish any significant differences between the plots, and the totals as shown in Table t do not reflect the true yields. The yields from the undamaged plots alone of each treatment put the nitrogen plots in the lead, the sulphate of ammonia being first.

Heavy rain during the drying period adversely affected the colour of all fruit, and no attempt was made to classify the fruit from the different plots.

By 1939 it had become apparent that the vines not receiving nitrogen were rapidly weakening, and the experiment was altered by adding nitrogen to various plots, as well as superphosphate to the previous potash plots, so as to afford an opportunity to test the value of a complete manure and various mixtures of nitrogen and phosphorus.

(Continued on page 140.)

# 1738ECT PESTS. Notes contributed by the Entomological branch.







### Bean Fly.

(Agromyza phascoli.)

For the successful production of late summer and autumn beans in most coastal areas north of Sydney it is necessary to spray the crops while they are young with a mixture of nicotine sulphate and white oil emulsion to control the bean fly. This pest lays its eggs in the leaves, and the larvae.

or maggots, upon hatching from the eggs, mine through the leaf tissues down into the leafstalk and then into the stems In cases of severe infestation the larvae destroy all the inner tissues of the stems. leaving only the outer bark and, is a result, the plants when they are fen days to a fortnight old topple over and die in a face. Less heavily infested plants become stunted

and yellow and their stems swollen and cracked. Moderately or lightly infested plants are easily broken off by wind owing to injury to the stems, but otherwise they do not suffer much ill-effect and their yield is

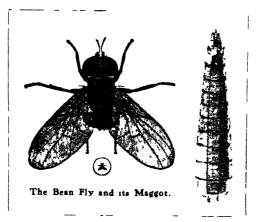
satisfactory unless weather conditions are rather dry.

The bean fly occurs along the coastline from the Queensland border to as far south as Wollongong where it causes losses only in late autumn plantings in dry seasons. Although it is essentially a coastal post.

the bean fly was recorded from the Moree district during the summers of 1940 and 1941, and it now appears that the pest has become established there. These are the first records of its appearance in bean crops west of the Dividing Range of New South Walcs.

The bean fly infests all our varieties of edible beans of the genus Phaseolus,

whether of the bush or climbing type, but it does not attack the broad bean. As soon as the plants are well through the ground the small, shining, black flies may be seen on the upper-surfaces of the leaves, and in



the case of severe infestation there would be one fly, and sometimes two or three, on almost every other plant. Even one fly to every half-dozen plants would result in heavy damage, whilst one to a dozen or so plants would constitute a moderate to light infestation.

The female bean fly stings the bean leaf from the upper surface and deposits its eggs singly within the tissues. An examination of the upper surface of the leaf will reveal the punctures made by the females when laying their eggs. The eggs hatch within two days in warm weather and the larvae from these eggs mine through the leaf for one day before they commence to burrow down the leaf-stalk on their way to the stems. As a result of the injury to the stems by the small white larvae or maggots, severely infested plants turn yellow when they are eight to ten days old and then commence to die off.

The larvae are fully developed eight or nine days after they hatch from the eggs. They then pupate in the stems and nine to ten days later the adult flies emerge from the small brown pupae. Under cooler conditions the fly develops more slowly, eggs hatch in four to seven days, the larval period lasts three to four weeks and the pupal period two to three weeks. During the winter, eggs require as much as twelve days to hatch; larvae six to eight weeks to develop; while the pupal stage lasts about four weeks. During the winter there is heavy mortality of all stages of the fly and with a greatly reduced rate of development, very few flies survive to infest spring crops Thus infestation is extremely light in all sowings made between June and October. In most areas, by about the end of December, the flies have so increased in numbers that they cause severe infestation in sowings made at this period. Along the central coast infestation usually continues to be severe

until about the end of April, and on the north coast until about the end of May.

#### Control.

The control of bean fly depends upon regular spraying with a mixture of nicotine sulphate and white oil emulsion to destroy eggs and larvae in the leaves.

The spray formula is:-

Nicotine sulphate ..... 1 fluid oz. White oil emulsion .... 6½ fluid oz. Water ...... 4 gallons.

It is necessary to spray only the upper surfaces of the leaves, and 40 gallons of spray mixture usually is more than sufficient to spray an acre once. Several applications of spray are necessary for effective control. In most areas, sowings made in January and February and up to the middle of March should be sprayed six to eight times, or until blossoming commences. Sowings made during the latter half of March, at the approach of cool weather, require less spraying, four to six applications being sufficient. Later plantings still, made in April, usually require only two to four sprayings.

It is important that the first application of spray be made when the first plants to show through the ground are not more than three days old. For example, plants commencing to show through the ground on, say, Monday morning should be sprayed on Wednesday. The second spraying should be made three days after the first and the subsequent applications at intervals of four days.

A regular spray schedule must be adhered to in order to destroy the eggs and larvae from time to time in the leaf-blades, as larvae that have entered the leafstalks or the stems are not affected by the spray. Regular spraying is most important where infestation is severe, as a lapse of even a day may enable sufficient larvae to enter the stems to cause serious injury.

#### Fleas.

(Pulicidae.)

DURING the past few months fleas have been reported as occurring in plague numbers in various districts.

It is usually found that when a plague of these insects occurs, either in a house

or garden, one of three species is responsible, the dog flea (Ctenocephalides canis), the cat flea (Ctenocephalides felis) or, rather less frequently, the "human" flea (Pulex irritans).

These species are not confined to the host animals mentioned, but they are the preferred hosts and it is possible, therefore, to have a very heavy infestation of cat fleas in a dwelling without much actual biting of the human occupants. The "human" flea has a wider host range than the other two species, and frequently reaches plague numbers in pigstics.



The "Human" Flea.

The eggs of fleas are laid singly; those of the "human" flea are deposited along skirting boards, between floor boards, or under the edges of carpets and linoleums, etc. The cat and dog fleas do not lay their eggs upon their hosts, but deposit them in situations frequented by these animals.

The maggot-like larva of the flea feeds on particles of organic matter and on the undigested blood passed by the adult fleas. When fully grown the larva spins a loose cocoon within which it enters the pupal or resting stage, and after a period in this stage the mature flea emerges. Both adult and larval stages can withstand starvation for periods of several months.

#### Control.

To control cat and dog fleas it is essential first to clean the bost animal, and this may be done by dusting into the animal's coat an insect powder such as deers or pyrethrum every week.

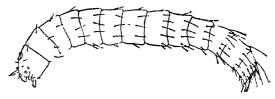
Dogs may be washed in carbolic sheepdip (prepared according to the maker's recommendation), care being taken afterwards to ensure that the carbolic is thoroughly washed out of the animal's coat with warm water, or it may cause injury.

As these fleas lay their eggs about the bedding of the host animals, or in places frequented by them, eradication must obviously include the breeding grounds as well

as the hosts. It must be remembered that apparently clean and healthy cats and dogs may produce fleas in enormous numbers. The bedding of the animals and places frequented by them should be sprayed thoroughly with kerosene emulsion or some other suitable disinfectant.

The materials used to clean up the house depend upon the nature of the furnishings. Very hot soapy water, kerosene emulsion, or kerosene-pyrethrum spray may all be used for this work, and good results may be obtained by rubbing a kerosene-soaked rag around the skirting boards and under the edges of carpets, or if the floor surfaces permit, pure kerosene may be applied with a small brush around the skirting boards and to the floor cracks, etc. If the kerosene-pyrethrum spray is used it should be driven in a heavy mist all over the floor and under all objects where fleas could be sheltering.

The cleansing of the house and removal of all small accumulations of dust from under carpets or edges of linoleums, etc., will assist in preventing their development in plague numbers, but it will not prevent the introduction of odd individuals. These may best be kept under control by the repeated use of the kerosene-pyrethrum sprays or kerosene alone.



The Larva of a Flex. [After Essig

When a pigsty is infested, the fleas may be controlled by spraying with either a carbolic sheep-dip (at the strength recommended by the manufacturer) or kerosene emulsion (1 in 10).

## Methods of Preparing Sprays.

Kerosenc-pyrethrum sprays (fly sprays) may be purchased ready for use or may be prepared according to the following formula:—

Pyrethrum powder .. .. 4 oz. Kerosene .. .. .. 1 quart.

Place the pyrethrum powder in the kerosene, mix and shake well, allow to stand over night, then strain through fine muslin. Methyl salicylate (synthetic oil of wintergreen ¾ fluid oz.) may be added to the mixture, which is then ready for use in an atomizer.

Kerosene emulsion is prepared as follows:—Cut up ½ lb. soap and boil in I gallon of water until dissolved. Remove from fire and stir in vigorously I gallon of

kerosene, mixing until a creamy emulsion is formed. This makes a stock solution which is diluted with water for use, at the rate of 2 pints of stock to 9 pints of water. The stock solution may be diluted at once with cold water, but if allowed to cool, it must either be reheated or else hot water must be used to dilute it.

## Sawflies.

(Tenthredinidae.)

SAWFLIES, some eighty species of which are known to occur in Australia, are medium or small-sized wasps with two pairs of wings and robust bodies. The females possess toothed saw-like ovipositors, which are used to insert their eggs into plant tissues.



The larvae of many species closely resemble caterpillars in general appearance. They have three pairs of well-developed true legs and up to as many as eight pairs of prolegs. Some secrete a slimy covering and thus resemble slugs. Most of the species are leaf-eaters, but some are leaf-miners and others gall-formers.

The steel-blue sawfly (Perga dorsalis) is the largest and probably the most commonly seen species in the coastal areas. Its range extends from Tasmania to north Oueensland.

The eggs, which are comparatively large, are laid in a row beneath the upper surface of the leaf tissues. The larvae feed upon the foliage of various species of gum trees, Eucalyptus spp., and may seriously defoliate young trees around homesteads. They are of gregarious habits, and during the day rest clustered together in a tightly packed mass on the stem or twig of the tree upon which they are feeding, but at night they wander individually over the foliage and later return to their resting place. When disturbed the larvae bend back their bodies and exude from their mouths a viscid yellow substance which has a strong eucalyptus odour. At the same time they raise the tips of their abdomens and tap up and down.

The young larvae are yellowish with black heads and at first cluster together on the



The Steel-blue Sawfly.

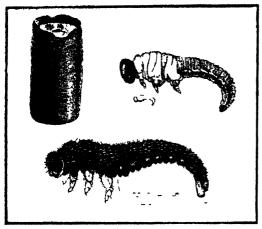
Reght.—Young larvae.

Left.—Cuticle of leaf removed to show eggs laid in the leaf tissues.

[Natural size.]

edge of a leaf where they feed for some days before selecting a site for resting during the day.

The fully-fed larva, which measures about 2 inches in length, is black and covered with short white hairs, and has no abdominal prolegs. When mature, they descend the tree in a slow-moving mass from their



The Steel-blue Sawfly.

Top left.—( ocoon Top right —Young laiva
Bottom -Mature laiva.

resting place and may wander about over the surface of the ground for several days before selecting a site in which to enter their pupal or chrysalis stage. As many as 250 caterpillars have been observed moving in mass formation in one group.

The site generally selected under natural conditions is the softer soil against the trunk of some tree. They burrow into the soil for a depth of several inches and spin their large cocoons in rows against each other, usually with their heads all facing one way.

The cocoons, which are dark-brown or black, are cylindrical, about 1 inch in length and about 1/2 inch in diameter. Their walls are thin but tough. One end is rounded, the other has a flat cap or covering.

The adult, which measures about 1 inch in length, is of a general steel-blue colour with yellow markings on the head and

thorax and yellow antennae and legs. The wings, which have well-marked veins are of a deep yellow colour. In the male the upper surface of the abdominal segments is covered with silvery down.

Amongst other sawflies which are of economic importance are the cherry slug (Caliroa limacina), the larvae of which are covered with a slimy exudation, the leaf-blister sawfly (Phylacteophaga eucalypti), the larvae of which cause leaf blisters, and Zenarge turneri, the larvae of which at times seriously defoliate cypress pines. Accounts of these three species have already been given in these notes.

While most members of the genus Pterygophorus are not considered to be of economic importance, the ironbark sawfly (P. analis) has been recorded by Tryon,\* in Queensland, completely defoliating the silver-leaf ironbark (Eucalyptus melanophloia), and in addition causing the deaths of numbers of cattle, which, while grazing in paddocks where infested ironbarks were growing, found the larvae on the trunks of the trees and ate them. The larvae of this particular sawfly crawl down the tree



Larva of Ptersgophorus sp Showing Slender Tail

trunks and mass together for some days before seeking a place in which to enter their pupal stage.

#### Control.

Where the infestation is limited, hand picking and destroying the larvae may be undertaken. An arsenate of lead spray at the rate of 1½ lb. of arsenate of lead powder to 50 gallons of water may be used.

# War Secrets Spread Like a Bush Fire.

<sup>\*</sup> Qld. Agric. Jl. XVI, pp. 208 216: 1921.

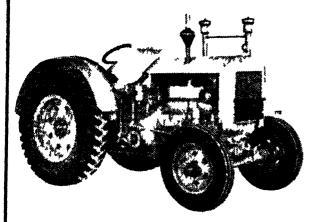
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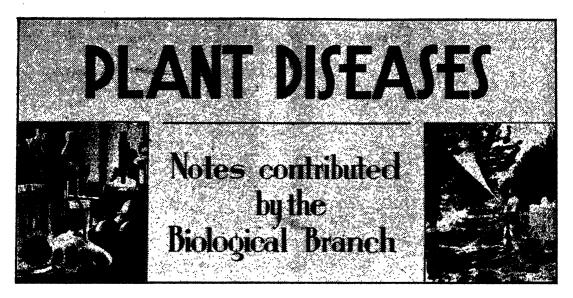
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# Internal Browning Of Pullar Cling Peaches.

INTERNAL browning of Pullar Cling peaches on the Murrumbidgee Irrigation Area, which has been under investigation for some years by Mr. H. Parry Brown, Plant Pathologist, is not of an infectious character. It is caused by unduly high temperatures during the last three to four days prior to full ripeness.

The condition is similar in nature, and in its association with high temperatures, to the "glassiness" or "watercore" and "watercore breakdown" of apples. Tissues at first

occur in pockets around vascular tissue. In some specimens it is noticeable only near the stone. Usually there is no external evidence of the disorder, except in advanced



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Internal Browning of Pullar Cling Peaches.

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appear water-soaked, then undergo browning and, in an advanced stage, have a thready or mealy texture. The browning may be distributed throughout the flesh or may cases when the fruit feels spongy and has a darkened skin colour resembling bruising. The usual absence of evidence prior to cutting and pitting has at times led to heavy unexpected losses to cannery and growers.

Internal browning does not develop nor increase after harvesting. It occurs on the tree during the final three or four days of ripening, and only when successive daily temperatures in the vicinity of, or higher than, 95deg. Fahr, coincide with this period.

Possible effects of soil type, tree vigour and age, position of fruit on the tree and irrigation practice, have been examined, but it is apparent that these are concerned only insofar as they influence time of ripening of the fruit. Thus, in the highly susceptible Pullar Cling variety early-maturing trees may be affected while late maturing ones may escape, or vice versa.

This variety ripens early in autumn, during three or four weeks (for the M.I.A. as a whole) in March and early April. In a consistently mild autumn there is no occurrence of internal browning. In other

years there occur periods when all pickings of fully ripe Pullar Clings inevitably include affected fruit.

## Recommendation for Prevention.

The disorder can be avoided by picking the Pullar Cling variety some two or three days earlier than full colour standard. This need be done only when temperatures at the time are in or near the high nineties.

Many growers have accepted this procedure in recent seasons and successfully avoided the disorder.

## Varietal Susceptibility.

In respect of varietal susceptibility it is of interest that both Golden Queen and Phillips Cling, which just precede the Pullar in ripening order, are reported to have been affected in one season. It is not certain that the condition was identical. In any case it has become apparent that their susceptibility is at least much lower than that of the Pullar Cling.

## Diseases of Carrots and Beet Grown for Seed.

In view of the shortage of certain vegetable seeds previously imported into this country and the consequent necessity for increased seed production locally, many growers will be interested in the diseases affecting these new seed crops, particularly in the case of two of the most important, namely, carrots and bectroot

#### Root Rots and Foliage Diseases.

In the case of both carrots and beet, the diseases may be divided into those which cause spotting or death of the leaves and those which affect the toots

Foliage diseases of carrots in this country include Macrosporium leaf blight and Cercospora leaf spot, and, whilst the latter is volv rare at present, the form, is somewhat more common, but even so, carrot foliage diseases are unlikely to be of any great consequence as a disturbing factor in seed production. Beet foliage diseases include downy mildew and Cercospora leaf spot, and although Cercospora leaf spot is a particularly serious disease on silver beet, neither it nor downy mildew are likely to be serious factors in the production of table beet seed.

On the other hand, root tots often account for very serious losses, especially in the case of carrots. Root tots are of importance because severe root rotting results in the complete death of plants with a greatly reduced yield of seed. Fungi such as the Scletotinia and Sclerotium rot fungi (Sclerotinia libertiana and Sclerotium rolfsii respectively) and species of Fusarium and Rhizoctoma as well as soft-rot bacteria may cause

rotting of carrot roots, particularly if they have been injured during digging and transfer to the place in which the seed crop is to be produced Beets also suffer from root rots caused by various fungi, some of which are true parasites whilst others only attack injured roots

#### Use Clean Soil-Avoid Root Injuries.

The two most important factors in these root rots of carrot and beet seed crops appear to be, firstly, the use of old land which had previously grown one of these or a closely related crop, and secondly, damage to the roots during transfer. Thus, control measures for these diseases are:—

- Very careful handling of the roots to avoid injuries of any type—even small abrasions on the skin may be important.
- 2 The use, for both the original root crop and the seed crop, of land which has not previously grown these or closely related vegetable crops. In fact, since some of the parasitic fungi causing rots of beet and carrot also attack many other vegetable crops, it would be preferable to use land which has been laid down to pasture or previously planted with field crops such as lucerne, maize, sorghum, millet, wheat or oats, rather than land used for vegetable culture.

It is possible that dipping the roots at transplanting time in a fungicidal solution, such as is used for the treatment of potato tubers, might help prevent the rotting of the roots, but no reliable information has been secured on this point.

## Late Blight of Celery.

THE late blight or leaf spot disease of celery is the most widespread and important disease affect ing this crop—It is caused by the parasitic fungus Septoria apri

The disease is first evident as brown dead spots on the leaves. These brown spots later become darker and numerous small black speeks appear on the dead areas. These speeks which can be seen easily with the naked eye are the pychidia of fruiting bodies of the fungus. If the spots are sufficiently numerous they may coalesce resulting in withering and death of the whole left. Although leaf infection is most common it is not unusual to find the stalks also affected.

The spores contained in the blick specks or pyenidia are the means by which the fungus is disseminated from plant to plant. The spread of late blight is tayoured by wet weather

#### Carried by the Seed.

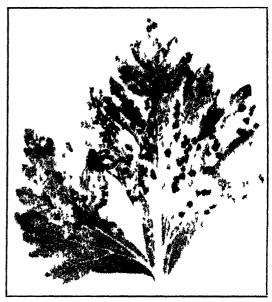
Although the discuse may be carried over from season to season on affected celery leaves and stalks left in the field at commonly is introduced into seedbeds field soil and new localities by means of infected seed. It is of interest to note that the spores of the late blight fungus carried with the seed lose their viability more quickly than does the seed and that two year old celery seed usually gives disease free plants if planted in clean soil.

#### Control Measures

- (1) Treat celery seed before sowing in hot water. Fit the seed I osely in a cheeseeleth lag and suspend for 10 minutes in a large volume (a keresine tinful) of water heated to exactly 155 d g. Fahr.
- (2) If planted on land which his previously grown celery spriv the plants in the seedbed and after they have been set in the field with 1/1/10 Borde in mixture. The plants should be sprayed at intervals of one or two weeks or sufficiently often to keep all new growth overed with the fungicide. Discontinue spraying about 10 days

before harvest The seed bed applications are most important and should commence when the seedlings are I inch high

(3) Practise field and seedbed sanitation in cluding destruction of diseased celery leaves and stalks by burning, rotation of crops and the use of clean soil for the seedbed. If it is thought that the seedbed soil may be infested with the late blight fungus it is advisable to treat it with a solution of formalin (1 in 50). This is applied at the rate of ½ to 1½ gallons to the square foot depending on the quantity necessary to saturate the soil. The soil is then covered for twelve hours with boards or bagging after which the covers are removed and the soil is stirred several times within the next two weeks to allow the functs to escape before planting.



Late Blight of Celery

## Root Knot.

ORGANISMS which attack the roots of plants are as a rule difficult to combat. Most difficult are those which attack a luge variety of hosts as they are less easy to climinate by rotation of crops

One such organism the root-knot nematode *Heterodera marioni* is parasitic on the roots not only of a large number of annual vegetable and flower crops and weeds but also of woody perennials such as garden shrubs and stone and pome fruits

Severe infection results in dwarfing and inthrifty growth, poor colour and a tendency to wilt during periods of hot weather. Moreover,

infected plants are more hable to attack by root-rotting fungi such as I usarium than are healthy plants

The nematodes attack the roots and the visible signs of their presence are swellings and irregular warty outgrowths which interfere with the flow of sap in the root

I he female nematodes are present within these galls and may be detected as small, white glistening bodies just visible to the unaided eye leggs are produced in large numbers so that under favourable conditions the soil will become thoroughly infested in a single season

Light sands so is are more hable to become severely infested than are heavy soils

Nematode galls are sometimes confused with the nodules normally developed on the roots of leguminous crops. These are of an entirely different nature and are beneficial to the plant. They are easily distinguishable as they are mostly lateral in position, easily detached, and do not cause swelling and distortion of the main roots.

#### Control Measures.

Once a crop has become infected it is scarcely possible to eliminate the disease. In the case of perennial crops such as fruit trees, it is therefore most important to reduce the chances of infection to a minimum, and special precautions should be taken when the soil is light and sandy. Nursery stock found to be infected should not be planted. The practice of planting susceptible vegetable crops such as marrow, pumpkins, squash, beans, &c., between the rows of young trees is a dangerous one since if nematodes are present at

all their numbers will be greatly increased by this means. In such cases, if cover crops are grown they should be of non-susceptible varieties,

Small areas of soil for intensive culture are best sterilised by steam if infested by nematodes.

Fumigation with carbon bisulphide or chloropicrin is also successful, but the cost, except for small areas, is prohibitive. For large areas summer fallowing or the rotation of non-susceptible with susceptible crops is the most practicable method of keeping the nematode population of the soil within reasonable limits. For the summer fallow the land must be kept clear of weeds by frequent cultivation especially after rain, so that as the eggs hatch the nematode will be starved and destroyed. Resistant crops which may be alternated with susceptible ones are oats, barley, wheat, certain American varieties of cowpea and velvet beans. Onion and peanuts are also fairly resistant.

## FERTILISERS FOR SULTANAS.

(Continued from page 131.)

## Conclusions.

The addition of superphosphate at the rate of 1 or 2 lb. per vine did not improve the yield during a period of six years, over the system of growing sultanas with an annual green manure crop given 1 cwt. superphosphate per acre at seeding and ploughing under each year's vine prunings.

The addition of potash caused an improvement over the superphosphate treatment, equal to the nitrogen treatment, for a period of three years after the start of the experiment, but after that the yield declined to the superphosphate level.

The addition of nitrogen (sulphate of ammonia 1/2 lb. per vine and blood and bone 11/2 lb. per vine) improved the yield by

the third year, and maintained it at the highest level during the subsequent three years of the experiment. As phosphorus was found to have no effect, the increases in yield from blood and bone treatment are ascribed to its nitrogen content. The differences in yield between sulphate of ammonia and blood and bone are attributed to the relative amounts of nitrogen applied in each, namely 0.1 lb. in sulphate of ammonia and 0.07 lb. in blood and bone per vine.

These applications of nitrogen slightly reduced the Beaumé readings and widened the drying ratios each year. Only once in the four seasons in which the fruit from the experiment was graded separately did nitrogen cause the fruit to be graded lower than other manurial treatments, and in this instance it was equal to the no manure plots.

## DEATH OF MR. J. M. ARTHUR.

READERS will regret the death, early this year, of Mr. J. M. Arthur, who, for the past twenty years, was orchardist at Hawkesbury Agricultual College.

Mr. Arthur was sixty-three years of age at his death. He joined the staff of the Department in 1908, and served for some years at Wagga and Yanco Experiment Farms, in addition to working among the early settlers in the Murrumbidgee Irrigation Area.

Many of the younger officers of the Department owe much to Mr. Arthur's instruction, and his work with the Royal and other Agricultural Societies was well known.

His many friends in the fruitgrowing industry will join with officers of the Department in extending sympathy to Mrs. Arthur and the members of her family.



# Some Dry Weather Problems.

THE exceptionally dry conditions experienced in the western inland districts during the summer months have considerably interfered with honey production from important sources of supply, such as yellow box and St. Barnaby's thistle. The yellow box did not fail in all localities to secrete nectar, but rather the lack of pollen supplies from other sources caused the colonies to economise in brood-rearing and thus become weakened in strength, and in this condition they could not make the best of the honey flow. The "box" trees do not yield any useful supply of pollen, and in the inland areas where they occur, bees must depend mainly on ground flora to provide the necessary supplies of this nitrogenous food for brood-rearing. During a dry time, however, the growth of all species of ground flora is seriously restricted.

In spite of the fact that a good deal of experimental work has been carried out with pollen substitutes for bees during a shortage of natural supplies, bee-farmers generally have not taken advantage of the knowledge that has been accumulated. Some of the recommended foods may be difficult to obtain, but others are readily available. The following recommendation by the Council for Scientific and Industrial Research comes within this latter class and is worthy of trial. It consists of dried milk mixed with sufficient bran to prevent caking in the open. with the addition of a little cocoa to make it attractive to bees. Then again, linseed meal and pollard, which gave good results at Hawkesbury Agricultural College, is another pollen substitute that is easy to obtain. Small quantities of these substitute foods are very helpful in maintaining a reasonable colony strength in difficult seasons.

This has been one of those rare summer seasons, too, when it was of little use transporting bees to coastal areas to recuperate, as conditions on the coast were also extremely dry. Petrol rationing also had some restraining influence in the matter of moving bees.

## The Small Black Ant.

The dry conditions in the inland districts appeared to favour an increase of ants and other pests in the apiary. In some localities the little black ants became a real menace to bee colonies, and migratory bee-farmers who established sites on infested country without having first taken precautions to deal with the pest have experienced a very anxious time. Weak colonies, with their organisation disturbed on account of being moved, were most susceptible to attack and losses

occurred. In other cases, during extracting operations from strong stocks it was found that the ants persisted in reaching the newly-returned extracted combs ahead of the bees, and in some instances the bees deserted the hives rather than face the horde of invaders.

The Department issues a free pamphlet, "Ants and their Control," which fully describes the preparation and setting out of poison baits most effective against the



Lucky Find for Beekeeper. Colony established in end of hollow log,

species which invade the bee-hive Useful containers in which to place the poison for distribution about the apiary are shallow tobacco tins covered with strips of wire cloth to admit ants and at the same time prevent entry of bees. Ant-proof hive stands may be used as a preventive measure, but even in this case it is advisable to reduce the pest by the use of poison baits.

## Beekeepers Co-operate with Department.

A number of "hobbyist" beekeepers with long experience have contributed a good deal toward the advance of bee-farming, both from the point of view of scientific observation and the application of useful practical knowledge Just recently Mr. Albert Yeo, of Ashfield, co-operated most helpfully with the Department in investigations

covering the influence of environment on the temperament of bees, and Mr. E. W. Robertson, of Chatswood, has now supplied very interesting data covering his observa-

tions and work in the apiary.

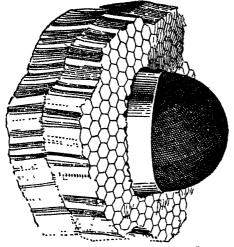
Mr. Robertson recently imported queen bees from Ohio, U.S.A., getting them through by Clipper air-mail. Two small consignments came over very successfully, and since the time occupied in travel was of short duration, the ordinary shipping cage (4 inches x 2½ inches) provided ample accommodation for each queen and her escort worker bees. Mr. Robertson arranged the importation because of his personal interest, but also with the idea that the experiment might benefit the bee-farming industry. After the war Australia may have to depend mainly on securing importations of bees from the U.S.A. rather than from Italy, because of the danger of introducing Acarine disease from the latter country At the present time, of course, the difficult position of air transport and the problem of dollar exchange preclude any further importations being arranged.

## Introducing Imported Queens.

The plan adopted by Mr. Robertson for introducing the imported queens in his apiary was as follows:-Three-frame nucleus colonies with ample supplies of young bees were drawn from populous hives of good-tempered Italian stocks. These were set out on stands protected from ants, and the old bees, which mostly cause trouble in introduction work, were allowed to drift back to their old homes. Then each queen, with a few young bees, was placed under a press-in cage (meat-cover type as illustrated) on a portion of the brood comb in a nucleus where she would have an opportunity of laying in some cells if such were required. In twenty-four hours' time the hive was examined and if the bees were contented the cage was lifted up and the queen liberated. The queen was kept under observation for a few minutes to ensure that the bees were taking kindly to her presence amongst them.

## Some Important Points.

A point particularly emphasised by Mr. Robertson is that before removing the cage the queen must be observed on the comb and not on the side of the cage. Moving the cage with the queen on the side of it would cause considerable disturbance in liberating her, and this would not be conducive to safe introduction. The press-in type of cage was used almost exclusively some years ago for introduction, and many beekeepers found it very reliable. Mr. Robertson adheres to its use even though he has tried most other later schemes, of which there are many, for introduction work.



"Meat Cover" Type of Introducing Cage

Where robber bees are active it is necessary, when the old bees have returned home from the nucleus and the queen has been introduced, to close the bees in with wire cloth and take the hive indoors for a few days so that the young colony will build up sufficiently to defend itself.

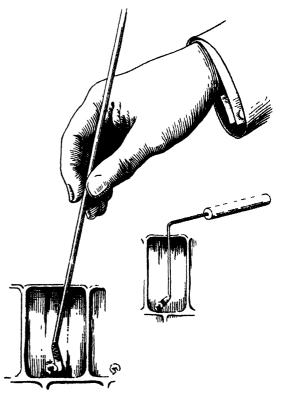
## Interesting Observations.

Careful and interesting observations were made by Mr. Robertson during the rearing of young queen bee progeny of the imported stock. One queen emerged from her cell on 18th December and was observed to return from a successful mating flight at 3 p.m. on 25th December. Indications of her impregnation (the protruding shreds of the membrane torn from the body of the drone) were clearly evident. Within ten minutes of entering the hive after her wedding flight, the queen, with the assistance of attendant bees, removed the complete organ of the drone from her body. This would seem to prove that the absorption and storage of fertilising material sufficient to fulfil the lifetime requirements of the queen is a comparatively rapid process. The queen bee in question was found to be laying in

forty-eight hours from the time the mating occurred. According to Mr. Robertson the foregoing is not just an isolated instance, as previous observations along the same lines have given similar results. It is admitted, of course, that unfavourable weather may cause some variation of the time in which a queen will be mated or commence to lay. The observations mentioned above were made under normal seasonal conditions.

A number of queen bees, the progeny of stock imported by Mr. Robertson, have been made available to Hawkesbury Agricultural College and to a few prominent private beefarmers in order that the beekeeping industry generally may benefit.

In transferring larvae in queen-rearing Mr. Robertson uses a very uncommon type of transferring needle. The needle in general use, a manufactured one, has a straight bar and when inserted in a cell to lift out a tiny larva it is inclined to obstruct a clear view of the operation. To overcome this objection, the needle made by Mr. Robertson (see illustration) has a bent bar.



Straight and Bent Larvae-transferring Needles.



# The Geologic Sources Of the Commoner Chemical Elements.

## Their Agricultural Significance.

(Continued from page 43.)

A. N. Old, B.Sc.Agr., Analyst.

## POTASSIUM.

From an agricultural viewpoint, potassium, unlike sodium, is of paramount importance as a major plant nutrient and one of the three elements commonly applied in large quantities as fertiliser, the others being nitrogen and phosphorus.

The difference between potassium and sodium compounds was not clearly demonstrated and understood until 1762, although the compounds had been known and used since ancient times. Aristotle described in detail the process for obtaining alkali (potassium carbonate) by the ashing of wood. The free elements were first isolated by Humphrey Davy in 1807.

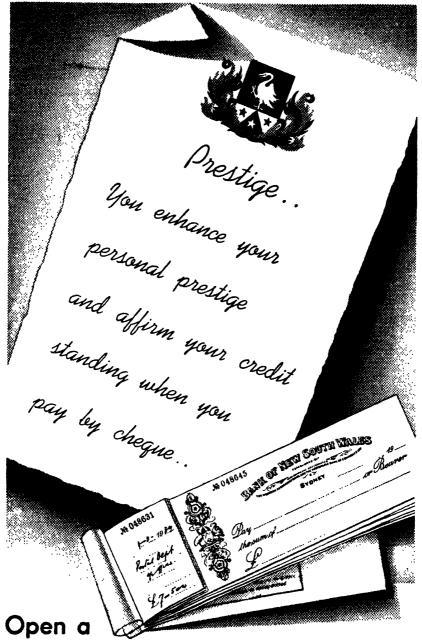
## Potassium in Silicate Minerals.

Some 2.4 per cent. of the earth's crust consists of potassium, the chief primary sources of the element being the potash-

bearing silicates. Orthoclase (K<sub>2</sub>O-Al<sub>2</sub>O<sub>3</sub>-6SiO<sub>2</sub>), the principal potash felspar, is very widely distributed in igneous rocks such as granites, syenites, rhyolites, trachytes and gneisses, and in felspathic sandstones. It contains 16·9 per cent. of potash (K<sub>2</sub>O). Microcline is a less common potash felspar. Sanidine and adularia are varieties of orthoclase.

Leucite, a member of the group of minerals called felspathoids, which contain less silica than the felspars, has the formula  $K_2O-Al_2O_3-4SiO_2$  and contains 21.5 per cent. of  $K_2O$ . Nepheline, another member of the group, contains a small amount.

Muscovite, potash or white mica, the ordinary mica of commerce, is a potash-bearing silicate; some other micas, including biotite (black mica) contain a little potassium.



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# AN ANNOUNCEMENT BY THE DEPARTMENT OF RAILWAYS.

READERS of the "Agricultural Gazette" will understand that, in existing circumstances, it is impossible to make any definite pronouncement regarding train services.

The best that can be done is to give an assurance that the Department will continue to provide both passenger and goods transportation in accordance with the facilities available for those purposes.

On their part the public are asked to accept, readily and cheerfully, any restrictions on train travel and the carriage of merchandise which it may be necessary to impose.

In thus co-operating with the Department of Railways during a period of intense activity, railway users will make a valuable contribution to the common cause.

Country residents desiring to make travelling plans are asked to get into touch with the local Station Master.

S. R. NICHOLAS,
Acting Secretary for Railways.



Glauconite, a silicate of iron and potash (5 to 8 per cent. K<sub>2</sub>O) occurs in a granular or earthy form as a sandy deposit called "greensand." It is associated with sandstones, clays and limestones, often of Cretaceous age, and is forming at the present day on the ocean floor. The oil-bearing sands of Oligocene age occurring at Lakes Entrance, East Gippsland, contain glauconite. Attention is drawn to this fact, as it is not known whether any investigation of the potash content has been made.

The extraction of commercial potassium compounds from most silicates is a difficult and expensive operation, so that they are derived mainly from the important occurrences of saline residues. About 40,000 tons of leucite, however, are quarried annually in Italy and glauconite has been used as a fertiliser.

## Potassium in Saline Deposits.

The decomposition of igneous and other rocks produces soluble potassium compounds which find their way into soils, organisms, rivers, lakes and oceans. Under appropriate arid conditions at different periods of the earth's geologic history, evaporation of lake and ocean water has resulted in the deposition of immense beds of potash and other salts in various parts of the world. The chief of these deposits, the Stassfurt of Germany, along with others in Central Europe, Asia, and the United States of America, were laid down in the Permian period, when immense coastal lakes were evaporated. The great thickness of the salts deposited indicates that the lakes must have been at intervals in communication with the ocean. More recently,

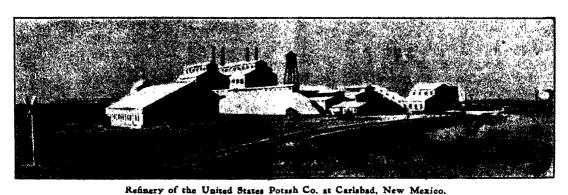
in Tertiary time, similar conditions prevailed and deposits were formed in France, Spain and Poland.

Potash minerals occurring in these saline residues include carnallite (KCl-MgCl<sub>2</sub>-6H<sub>2</sub>O), kainite (KCl-MgSO<sub>4</sub>-3H<sub>2</sub>O), polyhalite (K<sub>2</sub>SO<sub>4</sub>-MgSO<sub>4</sub>-2CaSO<sub>4</sub>-2H<sub>2</sub>O) and sylvine (sylvite) (KCl.) These are associated with various sodium, magnesium, calcium, caesium and rubidium salts. Sylvinite is the name given to a mixture of sodium and potassium chlorides, and is therefore not a mineral species. It is not to be confused with sylvanite, a telluride of gold and silver.

Originally, the Stassfurt deposits were exploited for their common salt content, the potash salts being regarded as waste materials. About a century ago, their importance was realised, and a tremendous industry developed which, prior to the 1914-18 war, gave Germany a world potash monopoly.

Some present-day inland drainage basins are important sources of potash. A growing industry in Palestine is the extraction of potash, bromine, etc., from the waters of the Dead Sea, the salt brine being pumped from the depths of the sea into shore vats, where it is allowed to evaporate in the sun. At Searles Lake, California, a town of 5,000 people has developed, based on potash and borax extraction. Forty per cent. of the potash production of the United States comes from the brine of this lake, the remainder having its source mainly in the subterranean deposits of Texas and New Mexico. A salt plain rich in potassium chloride occurs in Abyssinia, inland from Fatamari, on the Red Sea.

The water of the ocean contains 0.04 per cent. of potassium, and constitutes a source of the element to which increased



Rennery of the United States Potish Co. at Carisonal, New Mexico.

[Industrial and Engineering Chemistry,

attention has been given in recent years. A new process, based on the selective precipitation of potassium with dipicrylamine, was discovered in Norway, and a pilot plant with an annual capacity of 5,000 tons of potash ( $K_2(1)$ ) was in operation prior to the invasion.

## Alunite, Alum and Nitre.

The mineral alunite (K<sub>2</sub>O-3Al<sub>2</sub>O<sub>3</sub>-4SO<sub>3</sub>-6H<sub>2</sub>O) is considered to have been formed by the action of sulphurous vapours on rocks such as trachytes and rhyolites. It occurs in Italy, Spain, China, Western and South Australia and New South Wales—the New South Wales locality is at Alum Mountain, Bullahdelah. From alunite it is possible to obtain alumina (hence aluminium), potassium sulphate, and sulphuric acid.



Potato Plant Showing Potash Deficiency.
[U S D A. photo.

Alum (potash alum, K<sub>2</sub>SO<sub>4</sub>-Al<sub>2</sub>(SO<sub>4</sub>),<sub>1</sub>-24H<sub>2</sub>O) occurs near volcanoes, and in sedimentary rocks in which iron pyrites (FeS<sub>2</sub>) is being weathered—particularly in caves and under ledges in such rocks. Commercial alum is not, however, derived from these sources.

Nitre or potassium nitrate (KNO<sub>1</sub>) occurs in India, where it is of organic origin, also in Chile, where it is of inorganic origin and is associated with the sodium nitrate (Chile salt-petre or nitratine) deposits.

## Miscellaneous Sources of Potassium.

Many industrial waste materials contain large amounts of potash which it is sometimes practicable to recover. The flue dust of cement kilns and blast furnaces contains appreciable amounts of potassium compounds due to the fact that they are fairly volatile at high temperatures, as compared with those of calcium, sodium, aluminium, etc.

The water-soluble material, suint, of wool contains potassium, and the Australian wool clip has been estimated to remove annually the equivalent of 10,000 tons of potassium carbonate. If increasing amounts of wool were scoured locally, and in large plants, this could be partially recovered.

Other sources of potash are seaweed, plant ashes, and the waste liquors from the manufacture of power alcohol from molasses.

World production of potash in 1938 (prewar) totalled 2,865,000 metric tons, the chief producers being Germany, France, United Socialist Soviet Republics, United States of America, Poland, Palestine, Spain and India.

## Potash in Soils, Plants and Animals.

Potassium occurs in soils, (a) as relatively unweathered silicate minerals; (b) in the soil solution as soluble salts; and (c) as exchangeable potassium held by the organic and inorganic colloids of the soil. The last two sources are the important ones from the point of view of availability for crop use, the liberation of potash by the decomposition of the residue of silicates being very slow. In the colloidal base-exchange complex of the soil, potassium is absorbed more readily than sodium and loss of potash by leaching, except on sandy and peaty soils, is not great. The chief sources of loss of potassium are soil erosion, the export of crops, and the wasting of the liquid fraction of animal manure.

Recent work has shown that exchangeable potassium may, under certain conditions, change over in part to a non-exchangeable form—apparently muscovite or some similar mineral. Alternate wetting and drying hasten this fixation. Methods which have been recommended to combat this tendency are the application of potash fertilisers at a depth of several inches so as to lessen the influence of alternate wetting

and drying, localised application in granular forms and the addition of organic matter to the soil. Potassium held by the organic exchange complex is considered safe from fixation.

Plants, both land and marine, preferentially absorb potash from the soil Potassium is essential to the metabolic processes of the living cell—it influences plant respiration, the absorption of other mineral elements, the photo-synthetic process, the translocation of sugars and their conversion to starch, and the action of enzymes Apparently it does not enter into permanent organic combinations in the plant, for, although it is essential for the production of chlorophyll, sugars, starches, cellulose,

under which they were deposited, most of the potash was leached out; coal ashes usually contain less than 05 per cent.

When deficiencies of available potassium occur in soils, the physiological processes of plants are affected; outward signs of these changes are foliage discolourations, necroses of various kinds, and greater susceptibility to fungous diseases.

In animal organisms, also, potassium is essential, it occurs mainly in a soluble form, and much is excreted in sweat and urine and thus partially returned to the soil. In the case of sheep the potash is largely retained in the wool, as a constituent of suint or wool-fat.





proteins, oils, fats, etc, it is not an actual constituent of any of these substances. In this way it differs from other common elements in plants such as nitrogen, phosphorus, magnesium and calcium. Potassium is unique also, in that it is the only radioactive element essential for living organisms

Plant residues and the ash obtained from them contain considerable amounts of potash which may be returned to the soil in the form of animal manure and plant remains and by the ploughing in of green manure crops. Peat and coal are exceptional in that, because of the conditions

## Potash Fertilisers.

Under peace conditions a very large percentage of the potash used as a fertiliser had its origin in the deposits of Germany and France, which were used either as the crude salts or, for long shipment, as the refined salts—potassium chloride (muriate) and potassium sulphate, equivalent to 50 and 48 per cent K<sub>2</sub>O, respectively. Potassium nitrate, potassium phosphate and potassium ammonium phosphate have also been produced; these have the advantage that they carry only ions that have value as plant nutrients, thus saving transport.

Imports of potash to Australia have practically ceased since the outbreak of war; however, no appreciable amount of potash has ever been required by such major crops as wheat, oats, maize and hay in this country; the chief of our crops requiring potash are potatoes, bananas, tobacco and

vegetables.

The most promising sources of potassium in Australia—apart from animal manure and plant residues applied to soils—are (a) alunite, (b) fluedust from cement kilns and blast furnaces, (c) waste liquors from power alcohol manufacture, and (d) suint from wool scourings. The ash of prickly pear has been suggested as a source, but although the potash content is reasonably high\*, published claims have often been much exaggerated.

Reference has already been made, in discussing the element, sodium, to the occurrence in New South Wales of a series of alkaline rocks rich in soda and potash; these are not rich enough, however, to constitute a source of commercial potash.

## Potassium In Other Industries.

There is a widespread belief that potassium is of great importance in munitions; this, however, is only true in an indirect sense. Although potassium nitrate is required for the manufacture of slow-burning black powder used for fuses and the ignition of smokeless powder, and the chlorate and perchlorate for pyrotechnics, hand grenades, etc., the amounts involved are not large. Some 90 per cent. of all potash produced is used as fertiliser, and

its relation to wartime industry is mainly through the farmer. In this connection it may be noted that nitrocellulose is made from cotton, and that the cotton plant requires comparatively large amounts of potash.

Potassium chloride is the starting point for the manufacture of most other potassium salts, of which dozens are of importance in the various chemical industries. The hydroxide (caustic potash) is used in the manufacture of potash soaps, dyes, synthetic organic compounds, fine chemicals, glass, etc. Potassium carbonate is the preferred source of potash in glass manufacture, being used for the better grades of table, decorative, illuminating and optical glassware. Potassium replaces sodium in the softer types of soap and the harder types of glass.

Felspar is used to a large extent in the ceramics and glass industries, though it is here as much a source of silica and alumina as of potash.

## Radioactivity of Potassium.

The natural radioactivity of potassium makes it one of the most interesting of the elements from the viewpoint of studies of the earth's geologic history. There are three isotopes of potassium, K<sup>20</sup>, K<sup>40</sup> and K<sup>41</sup>. The first is most abundant, but it is the second one which is radioactive; the products are calcium and argon, together with both beta and gamma rays. The rate of this change has been used to estimate the earth's age. The argon, relatively abundant deep in the earth's crust, is thought to have been derived from radioactive potassium.

## Horse-breeding Act, 1940.

In the February issue of the Agricultural Gazette an announcement was made that applications for the registration of stallions under the Horse-breeding Act, 1940, should be made before the 1st March. It has now been found that, owing to shortage of necessary staff, petrol restrictions and other difficulties associated with the war, it will not be possible to carry out examination of stallions this year. The Minister has therefore decided to suspend for one year the operation of the provisions of the Act which

require the registration of stallions. During this period no restrictions will therefore be enforced regarding the use of stallions for breeding purposes.

It is still necessary for persons who have not yet notified the Department of the possession of a stallion to do so and, on application to the Department, the necessary form will be forwarded.

Transfers, deaths and castrations of stallions should also be notified to the Department.

Chemical Composition of Prickly Pear.—Agr. Gazette, May, 1939.

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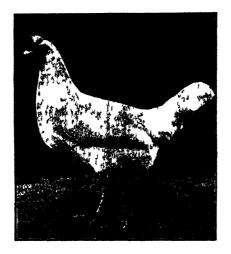
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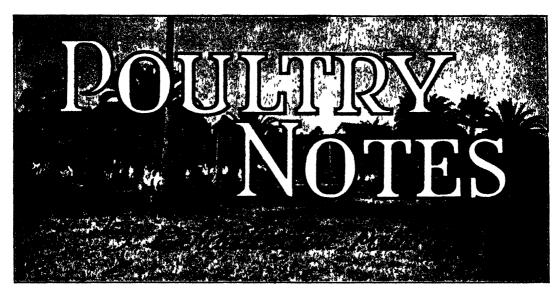
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# Maintaining Autumn Production.

WHILE it is natural for the egg yield to decline sharply during this month the management of the birds plays an important part in maintaining production at a reasonable level, and thus showing a profit over cost of feed instead of the loss, which too frequently occurs during the autumn.

FEEDING is one aspect of management which should receive closer attention at this time of the year than at any other period, as the appetites of the birds vary considerably from day to day and unless the amount of food is regulated accordingly production will suffer and an earlier moult result. What frequently happens is that food is allowed to remain in the pens from one meal to another and the birds cat less than would be the case if they were kept reasonably keen for their food. Therefore, the only course to follow is to give them at each meal just as much as they will eat within an hour of feeding without leaving any food.

There is only one thing worse than a surfeit of food and that is under-feeding. Some inexperienced poultry farmers make this latter mistake during the moulting season, when production is low, in an endeavour to reduce feed costs, but any attempt to effect a saving by this means is false economy, as it results only in prolonging the period between moulting and resumption of production, and causes the birds which might be laying to break into a moult.

If a reduction in the feed account has to be made, the only course is to cull out the hens which show signs of falling into a moult and allow the rest of the flock as much food as they require.

Another important factor at this time of the year is to avoid any drastic change in the composition of the ration or the time and method of feeding, as such alterations are likely to cause loss of production and earlier moulting.

## Factors in Housing.

Next in importance to feeding comes the matter of housing the birds. Unfortunately in many instances too little attention is given to the conditions under which the laying stock are accommodated. Any over-crowding, due either to too many birds being placed in a house or to the perches being too close, particularly in hot, sultry weather, might cause an earlier moult than would otherwise occur, and badly ventilated, or low, houses would accentuate the trouble. Such conditions are also likely to contribute towards catarrhal infection.

The safest course to follow until the cooler weather of the autumn sets in is to run somewhat less birds in the houses than they are designed to accommodate. This

applies particularly to the young stock, as they are likely to be more adversely affected than the older birds.

## DRINKING AND FEEDING UTENSILS.

Particulars concerning drinking and feeding utensils for poultry are often sought by poultry farmers, and in order to supply information on the subject illustrations and details of a number of utensils for chickens and adult birds are given herein. Fig. 1 shows chicken drinking fountains suitable for fifty to sixty chickens from day-old to six or eight weeks. These and similar types are sold by firms which cater for the sale of poultry requisites. They are classed as 1 quart, 2 quarts and 4 quarts capacity, and the sizes are, from left to right:—(1) Top



Fig. 1.-Chicken Drinking Fountains.

portion 37% inches high to the cone and 4 inches in diameter; tray 6 inches diameter by 13% inches deep. (2) Top 47% inches high x 5 inches; tray 77% inches diameter, x 21% inches deep. (3) 63% inches high x 7 inches, tray 93% inches diameter x 21% inches deep.

Various types of automatic watering systems for brooder houses are seen in use on farms, but few are entirely satisfactory

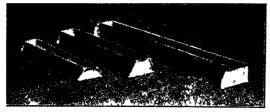


Fig. 2.-Wet Mash Feed Troughs for Chickens.

owing to the difficulty of maintaining them in a hygienic condition and to the risk of spreading diseases. Moreover, it is not possible to locate the drinking vessels of such systems in a position which is suitable for baby chickens as well as older ones,

consequently an independent type of vessel is necessary for the chickens during the first week. It is thus questionable whether there is much advantage in installing even the best type of automatic system for chickens in the brooders.



Fig. 3.—Feeding Trough Suitable for Adult or Growing Stock.

Fig. 2 depicts wet mash feed troughs for about fifty chickens one day old to six weeks. Reading from left to right the dimensions are:—(1) 17 inches long 2½ inches wide in the opening, and 1¼ inches deep; while the ends are 4½ inches at the bottom, 2½ inches at the top and 1½ inches high. (2) 20 inches long, 2½ inches wide and 2½ inches deep; ends 5¼ inches at bottom, 2½ inches at top and 2½ inches high. (3) 30 inches long, 2½ inches wide and 2½ inches deep; ends 5½ inches at bottom, 2¾ inches at top and 2½ inches high. In each case

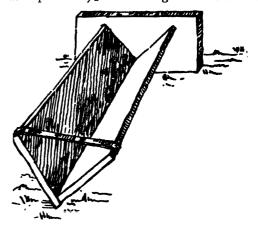


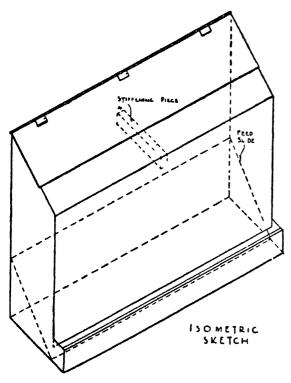
Fig. 4.—Alternative Type of Feeding Trough.

there is a clearance of  $\frac{3}{6}$  of an inch beneath the troughs to allow them to stand firmly on the floor.

For durability these troughs should be made of 24 gauge galvanised iron. It will

be noted that the troughing is rounded, with the sides turned in slightly at the top to prevent the mash being scratched out. These types have proved to be most satisfactory and the smallest size is suitable for chickens up to two weeks old, the second size from two to four weeks and the largest from four to six weeks or older if desired. side, to which the end can also be nailed. For young stock up to half-grown, troughs about 3 ft 6 in. to 4 feet long are most convenient, one of which would serve thirty-five to forty birds.

For adult birds larger materials could be used, the sides being made of timber 6 and 7 inches wide by 3/4 or 1 inch thick, and





This hopper is 3 feet high at the back and 2 feet high at the front, and 4 feet wide and 1 foot from back to front, the top half of the sloping hid is hinged and overlaps the lower half. The bottom projects forward 3½ inches and the front edge of the tray is 5 inches high with the edge turned in ½ inch to check spilling. The opening at the bottom of the front is 3½ inches and the feed slide is set at an angle of 45 degrees, with the bottom edge 1 inch back from the front of the hopper; that is 4½ inches from the front of the tray. The stiffener is of 2 inch x 1½ inch timber.

However, after six weeks the type shown in Fig. 3 can be adopted. The dimensions of this are 36 inches long, 6 inches wide and 3½ inches deep, the end being 12 inches long x 4½ inches high. The edges are rolled and stiffened with No 8 gauge fencing wire, which also supports the open end.

A similar class of trough made of wood, as depicted in Fig. 4, would serve in times like the present, when difficulty is experienced in obtaining galvanised iron. The wooden trough could be made of timber 34 inch thick, by nailing together. "V"-shaped, two pieces, one 5 inches wide and the other 6 inches, and then fixing the end, which should be 12 inches long and 6 inches high. A piece of hoop-iron nailed around the open end completes the job, but the wooden end can be made more secure by nailing two 2-inch x 1-inch cleats on to the "V"-shaped

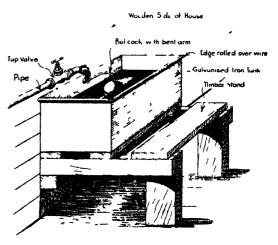


Fig. 6.—Water Trough Fitted With Ball Cock Suitable for adult birds

the length can be any size up to 6 feet. This size being large enough for twenty-five birds.



Fig. 7.—Water Vessels for Adult Birds or Growing Stock,

For feeding dry mash, a hopper as shown in Fig. 5 is suitable. This can be constructed of galvanised iron or wood and the dimensions given are for one large enough for seventy-five to a hundred adult birds.

Smaller hoppers made on the same principle can be used for chickens.

Fig. 6 shows a water vessel for adult birds, fitted with a ball cock control. The dimensions required for a flock of 100 to 150 birds are approximately 20 inches long, 12 inches wide and 7 inches deep.

Where it is not possible to instal such an automatic system, or in cases where additional vessels are required for use such as on hot days, also for chickens over six weeks of age, the types illustrated in Fig. 7 are satisfactory. Taking them in order from left to right, the first would be suitable for small pens of ten to fifteen adult birds, the second for fifty to seventy-five chickens over six weeks of age, the third for about fifty half-grown birds, and the fourth for fifty to seventy-five adult birds. The inside dimensions are:—

1-8½ inches diameter x 6 inches deep; 2-10 inches diameter x 4 inches deep; 3-12 inches diameter x 6 inches deep; 4-12 inches diameter x 8 inches deep.

The top edges are rolled, and a rim is rivetted on to the bottom to prevent rusting.

## Pastures and Superphosphate Shortage.

(Continued from page 118.)

applications of superphosphate can be resumed. Other clovers, such as ball or cluster, white, and barrel, will behave similarly.

## Requirements of Old Wheat Land.

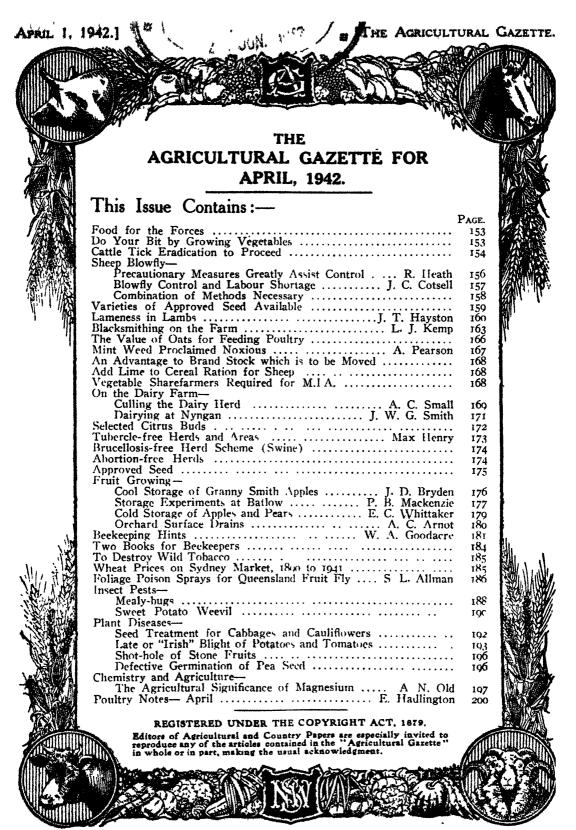
In wheat districts the use of clovers for restoring fertility to depleted and croded soils is becoming popular. The common procedure is to sow the clovers alone or with lucerne and Wimmera rye grass with the last crop of wheat, the land being left under pasture for periods of three years and upwards. To build up fertility it is necessary for the clovers to become established quickly

and to make vigorous growth, perhaps during a short period in accordance with a planned rotation. The superphosphate used normally with the cereal will in most cases meet the establishment requirements of the legumes, but unless it is possible to provide another application in the second-year clover growth will prove disappointing. In such cases it will be advisable to confine the seeding to lucerne and Wimmera ryc grass in addition to the cereal. Lucerne will usually provide reasonable production even without superphosphate, and something will be gained in resting the land from wheat for a number of years.

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The Agricultural Gazette.

April, 1942.

## Food for the Forces.

## New Federal Directorate.

THE creation of a Federal Directorate of Defence Foodstuffs for the purpose of gearing production and supply of military food requirements to the war machine—it will also co-operate in maintaining supply of essential civil foodstuffs—should introduce a degree of positiveness that was somewhat lacking in previous agricultural planning.

After more than two years of war we are still faced with the problem of surpluses in some fields of primary production while in other directions shortages are acute. Drought has admittedly been an upsetting factor and has been responsible for some shortages but even had the seasons been normal it is very doubtful if the present huge requirements in certain accounts of production would have been grown under a system which left the producers without specific direction in

the choice of their production programmes. This is no reflection on primary producers, the same unbilanced output would almost surely have presented itself in the munition industries in the absence of central direction and control, and could have resulted in the production of an abundance of bullets and shells and very few rifles and guns.

Australian primary producers are alive enough to the scriousness of the present situation to be moved to extraordinary efforts if necessary, by appeals to their patriotism alone. The element of profit, however, has not by any means been removed from the contemplated foodstuffs production scheme. Recently wide publicity was given to the fact that contract prices had been agreed upon for a number of urgently required vegetable and seed crops, and this should ensure payable returns to growers. Vegetables are at present receiving special litention, but other necessary crops will be given consideration in due course.

The sure and profitable markets thus guaranteed should to some degree, result in the transfer of activities from the unwanted (and consequently less prointable) to the wanted lines of production. This factor plus the greater availability of labour for the wanted lines of production are likely to right, to an appreciable extent, the over production problem in some branches of primary industry. In any case provided we are adequately supplied with essential foodstuffs an over-production of storable products less urgently required will not be a burden, it might well prove extremely valuable in an emergency.

Do Your Bit by Growing Vegetables.

MANY thousand tons extra of vegetables are urgently required to supply not only civil requirements but the vastly increased demands of the Allied fighting forces in Australia Every means of publicity is being used to speed up this vegetable growing drive and to

impress upon intending growers the urgency and importance of this valuable war effort. The Minister for Agriculture has sent out a written appeal to every landholder with irrigation facilities to co-operate to the utmost. Nothing is being left to chance. The requirements of the various crops will be determined from time to time and contracts arranged. Steps are also being taken to ensure that sufficient labour is available to contract grovers.

is available to contract growers.

The recently created Directorate of Defence Foodstuffs is prepared to accept contracts immediately for the production of several thousand tons of the following vegetables at the prices shown below. The prices are f.o.r. or f.o.b. at production centres.

#### Vegetables.

Silver Beet £10 per to	on on
Beetroot	nc
Parsnips £11 per to	on
Cabbages £10 per to	n
White Turnips 17 per to	nc
Carrots £11 per to	
Vegetable Secds.	
Beetroot       2s. 6d. per 1         Silver Beet       2s. per 1         Cabbage       10s. per 1	b.

Onion (Early Barletta types)—

178. 6d. per 1b.

Onion (midseason varieties, Hunter	River
type) 158.	per lb.
Parsnip 2s.	per lb.
Tomato 20s.	per lb.
Turnip (table) 28.	per lb.
Turnip (swede) Is. 6d. & 2s.	per lb.

The Department of Agriculture will arrange the contracts in New South Wales and interested growers are advised to get in touch with the Chief of the Division of Plant Industry as early as possible, so that preliminary arrangements can be made for the letting of the contracts.

possible, so that preliminary arrangements can be made for the letting of the contracts.

As far as possible it is desired to encourage large scale production of fresh vegetables in districts where there are large concentrations of troops, and in areas such as Leeton and Bathurst, where canneries are available to handle the local production.

Contract growers and intending growers affected by lahour shortage should communicate with the Under-Secretary and Director, Department of Agriculture, setting out details of areas and kinds of vegetables to be sown (making special mention of any substantial increase in acreage); area to be, or which could be, irrigated; permanent workmen required; casuals required (and periods); accommodation available; and the extent to which female labour can be used.

## CATTLE TICK ERADICATION TO PROCEED.

## NEW REGULATION AND NOTIFICATION GAZETTED.

FOLLOWING the recent decision of the Supreme Court that the notification requiring the dipping of stock in the Grafton Quarantine area was invalid and that the orders issued by inspectors were also invalid the Minister for Agriculture has now issued a further notification requiring the treatment for cattle tick of all cattle, horses, sheep and goats in the Grafton Quarantine area by a curative method.

A regulation has also been approved by the Governor and Executive Council requiring all occupiers of land in the Grafton Quarantine area to dip their cattle, horses, sheep and goats in an arsenical solution prepared in accordance with the regulation. This treatment is to be carried out at successive intervals of 14 days until 38 dippings have been completed. The regulation authorises an inspector to determine the time and place at which the dippings shall be carried out. Provision is also made for spraying to be substituted for dipping in certain circumstances.

The notification and regulation were published in a special Gazette issued on 16th March, and they have been prepared in the light of the comment made by Mr. Justice Owen in the decision referred to.

# Cattle-dips Blown Up.

## "Sabotage," says Premier.

"Any interference with constituted authority at a time of war is an act of national sahotage, calling for the imposition of a heavy penalty," said the Premier. Mr. McKell, in commenting on the destruction of several cattle dips in the Grafton-Maclean area.

"Tick eradication on the North Coast has, up to the end of 1040, cost the State of New South Wales (with Commonwealth subsidy) no less than £3,000,000. No charge has been made on the dairy farmers and graziers of the north coastal areas for the treatment of their stock, which has resulted in a great saving to them and incalculable benefit to production generally."

"The material damage caused to the dips by these subversive acts is substantial, but it is small in comparison to an important war effort and the loss and inconvenience to other farmers, who will be compelled to travel their stock to more distant dips for treatment."

"The Government, as an essential and producing safeguard measure, is determined that the Grafton-Maclean area will be freed of tick infestation. It is determined to prosecute, with the fullest rigour of the law, persons who have been guilty of wilful destruction of public property."

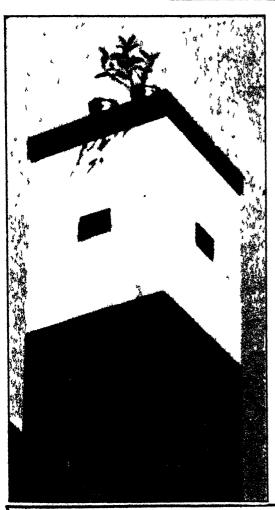
## APRIL 1, 1942.]

This regulation takes immediate effect and the Department is determined to insist that the eradication campaign shall be carried out.

The Minister for Agriculture makes a special appeal to stockowners, now that the legal position has been made secure, to let reason prevail and to co-operate with the Department in its endeavour to do something for their ultimate benefit and for that of all other stockowners in New South Wales. Although it was proposed to undertake immediate proceedings against any stockowner who refused to treat his stock as required by the new regulation it was hoped,

said the Minister, that this unpleasant action would not again become necessary.

Various representations had been made for an abandonment of the tick eradication campaign in the Grafton-Maclean area, but neither he nor the Government were of opinion that any of the reasons advanced were of sufficient weight to justify abandonment at present, said the Minister. He reminded opponents of the campaign that in the early stages postponement was urged almost solely on account of the drought conditions and lack of water—grounds which no longer existed. Other alleged objections, it was suggested, would also prove groundless as the campaign proceeded



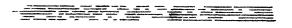


## The Hardy Fig.

This sturdy young fig is growing 40 feet above street level on top of a chimney of the Cleveland-street School, Sydney.

Port Jackson and Moreton Bay figs are growing in the park adjoining the school, and it is a safe guess that a bird has deposited the seed of one of these species on the top of the chimney in whatever little accumulation of dirt has been carried there by wind. The remarkable thing is that sufficient moisture should have fallen on this exposed position to germinate the seed and keep the plant growing healthily.

Photo Norman B Friend



Help Win the War. Buy War Savings Certificates.

# Sheep Blowfly.

# Precautionary Measures Greatly Assist Control.

R. HEATH, Stock Inspector.

IN seasons when the blowfly is bad the cost incurred by the average grazier in combating fly-strike has been estimated at £35 per thousand flock sheep. In addition fly-strike causes many detrimental effects to which a monetary figure cannot be given, but which may be considerably reduced by the adoption of approved methods of control and attention to animal management. Successful combat of the blowfly is closely allied with efficient station management.

Hand dressing of strikes, inevitable in some circumstances, costs approximately 1d. per sheep, and, in view of labour costs, the aim should be to carry out the operation with thoroughness in order to avoid repeated handling. It is for this same reason that yarding and drafting off of struck sheep is recommended. This procedure enables a more thorough examination and treatment of strikes.

## No Loss of Crutched Wool.

Another advantage of yarding and drafting is that all crutched wool may be treated and retained. In many cases the loss of wool when a sheep is paddock treated amounts to a pound per sheep. Treatment of wool is simple and entails no expense. It may be placed on a drying rack of netting, the maggots caught in a tray or on bagging and destroyed. In this way a direct attack is being made on the fly at its chief breeding ground (an active strike) and, combined with the use of a dressing toxic to maggots, fly abundance may be considerably reduced.

## Keep Sheepyards Free of Flies.

The assertion that flies are unavoidably more troublesome about yards cannot be supported, for if so, it would be equally true of sheep camps. The use of traps around a sheep yard, and the cleaning up of heaps of crutched wool (which are a breeding ground for the fly) will go far in overcoming the fly nuisance about a yard.

Yarding avoids knocking sheep about, as happens when an attempt is made to dress them in the paddock. There is little

to recommend this latter method. It is customary to hold the flock with a dog, which has the sheep constantly moving about. If the distance from a yard is great, temporary yards are easily erected and satisfactorily serve the purpose.

## Sources of Loss from Fly-Strike.

A considerable proportion of the economic loss from fly-strike is due to loss of wool, loss of sheep (this, in bad seasons, amounting to as much as 28 per cent.), tenderness and break in the fleeces of struck sheep, and the failure of struck sheep to thrive. Struck sheep frequently fail to breed; rams may be rendered temporarily infertile, and lambs usually fail to grow or fatten. Yarding and drafting sheep will overcome many of these losses by increasing the effectiveness of treatment, and this should amply justify the possible extra trouble involved.

## Avoid Dusty Yards.

The effectiveness of any control method may be impaired or partially annulled by indiscretion in carrying out the operation. For example, yarding of sheep into dusty yards, although effective and saving in regard to treating strike, may prove so detrimental to the wool as to affect its final value.

It is particularly unwise to mark or to "mule" lambs in dusty and dirty yards, for the reason that dangers of contracting such diseases as tetanus and arthritis are increased. The value of shade trees about yards is inestimable; they keep the yards cool and act as a breakwind to prevent dust. Where possible, yards which are likely to be

dusty should be watered for such operations as marking, "muling," etc., or, where this is not possible, the removal of surface manure will greatly assist.

## Disinfect all Instruments.

So as not to expose the sheep to disease or impede healing, and thus increase susceptibility to strike, all instruments used for marking, "muling" and similar operations should be placed frequently in a disinfectant solution.

An important factor which should at all times be considered is the maintenance of the sheep's strength or condition. This may be seriously affected by working sheep in the heat of the day, and by the misuse of dogs.

# Blowfly Control and Labour Shortage.

Classing of Flocks is Helpful.

J. C. COTSELL, Senior Sheep and Wool Instructor.

THE classing of a flock on lines of general commercial usefulness will remove automatically a very large proportion of the fly-susceptible sheep. This will enable the labour available to be employed on the better class sheep in the flock. How best to market the low grade culls is another problem. However, to retain these commercially inferior sheep in the flock when labour to treat them for fly-strike is either not available or can be employed to better advantage in other directions is an unsound proposition.

Crutch strike in ewes is responsible for the greatest proportion of fly trouble, except in occasional years when seasonal conditions bring body strike into prominence. most effective work can be done, therefore, by rendering the crutch of ewes unsuitable for egg laying by the blowfly, or at any rate for the development of the maggots during their first two or three days. It has been found that the one factor which is common to all types of crutch formations in susceptible sheep is moisture. Folds and wrinkles force wool staples into a position where they cannot help but be constantly wet, and the folds themselves become moisture traps, preventing exposure to the drying effects of the atmosphere, and eventually causing inflammation by contant rubbing —an ideal spot for maggot development.

## Methods to Decrease Fly-Strike.

Encouragement of the growth of the wool in such a manner as to prevent its being constantly wet with urine is the obvious solution. This can be accomplished by breeding or by surgical means. Further insurance is provided by removal of the crutch wool, and by the deliberate contamination of the wool by a poisonous jetting fluid. These four avenues are in themselves sufficient to provide a very considerable decrease in fly strike.

Breeding non-susceptible, plain breeched sheep is a long-range project, and, like the Mules operation, in which the breech folds are removed surgically, it is a permanent remedy. A crutching-jetting combination, on the other hand, provides immediate but only temporary relief during bad fly waves

In view of the present labour shortage and other abnormal conditions, the Mules operation is likely to be favoured in preference to a long-term breeding programme, but the latter should always remain as a background for all other blowfly combative measures. The result will then be that every year's drop of lambs will become appreciably plainer breeched, until eventually the necessity for adopting all other measures will be reduced to a minimum.

## Wool Quality not Appreciably Affected.

It is usually admitted that the plainer type of ewes is the better "doer" and mother, and generally requires less attention, but always the doubt crops up as to whether the weight and quality of the wool clip will suffer; whether the fleece of the plain-bodied sheep will become too open. Actually, a number of investigations have shown that the difference in value between the two types is extraordinarily small; loss in density is made up by greater size and skin area, greater length, and higher scoured yield. It

is significant that the champion stud sheep at the annual sheep show are not the heavily wrinkled ultra-dense types, but the relatively plain-bodied sheep.

Bound up with this plain-breech breeding programme, the very valuable help given by flock classing must be emphasised. The removal, ringly or in combination, of the short, harsh, dingy ultra-heavy wools, and con-

formation faults such as narrow hips and shoulders and misshapen legs, will, although designed primarily for commercial reasons, be found to have removed not only a large number of wrinkly sheep, but also a large number susceptible for other reasons. Surely this procedure, which can be carried out in many cases in less than a day, is preferable to the endless and futile crutching, jetting, and dressing of inferior quality sheep.

# Combination of Methods Necessary

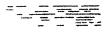
To Deal With the Blowfly.

NO satisfactory single method of control is ever likely to be evolved that will solve the sheep blowfly problem. Too many sheepmen tend to favour one measure of centrol to the exclusion of all others. The widespread exclusive use of blowfly dressings is a case in point. To rely entirely on a dressing is to begin at the end; it is necessary to wait until the damage is done before the treatment can be applied. In other words, it implies an acceptance of the inevitability of fly-strike.

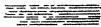
## Fly-Strike not Inevitable.

The latest research work on the sheep blowfly has been directed towards the prevention of strike in the first instance and this is surely the most logical way of dealing with the problem Sheepmen are urged to acquaint themselves with all the measures recommended. An intelligent choice can then be made of a combination of methods that will best fit into a definite plan of cam-





Non-Susceptible
Type of Merino Ewe
Showing
Excellent Quality
Fleece.



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paign against the fly menace. District sheep and wool instructors, veterinary officers and stock inspectors are anxious and willing to assist in every way possible in this regard.

## Do You Know?

Do you know that it is possible to anticipate a fly wave? This enables you to work out a plan of action in advance, instead of rushing around frantically with a pair of shears and a bottle of dressing when the trouble begins.

Do you know that there are certain outward recognisable signs which will enable you to pick out in advance which of your sheep will be struck first and most often every year? If you know the sheep which are susceptible to strike, have you considered the inadvisability of retaining them on your property? If for some reason you must retain them, have you given any consideration to the amount of labour you can save by keeping the susceptible types in a separate flock, or of making them non-susceptible by the use of the Mules operation?

Do you know that it is possible to avoid breeding this susceptible type of sheep? It is a long-range plan, but can be proceeded with slowly at the same time as you are employing the more urgent control measures.

Do you know that flock classing will achieve more than one objective at the same time, because it removes so many of the faults which in themselves make a sheep susceptible to fly strike?

Do you know the cost, practicability and value of the different control measures recommended; what length of immunity is given by jetting, or jetting in combination with crutching, and which is the cheapest and quickest method of jetting?

Do you know that most strikes are caused by one particular species of fly and that trapping catches relatively few of this type? That carrion breeds far fewer of these pest flies than does the living sheep?

Do you know that you can reduce the susceptibility of your lambs by 75 per cent. or more by leaving the tail slightly longer than has been the custom in the past?

Do you know that B.T.B. is the best blowfly dressing available?

Do you know that by carefully choosing your shearing time (particularly in the case of young sheep) it is possible to enable your flock to escape the less frequent body-strike waves?

## Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties.

Bencubbin, Ford, Gular, Totadgin, Pusa 4, Cailloux, Eureka, Eureka 2, Fedweb 1, Bordan, Waratah.

Belar, Gidgee, Mulga, Fulghum, Algerian, Buddah. Cauliflowers—

Hawkesbury Solid White, Nugget, Shorts.

١,

Lomatocs-

Australian Earliana, Bonny Best, Improved Walker's Recruit, Red Marhio, Salad's Special.

Hunter River Brown, Maitland White.

Pumpkins-

Queensland Blue.

Beans-I weed Wonder, Brown Beauty.

Sorahum-

White African, Saccaline, Jones.

Japanese Millet-

Grasses, etc -

Phalaris tuberosa, Sub-erranean Clover (midscason), Sudan Grass, Lucerne

## WAR GOSSIP IS DANGEROUS.

Enemy agents are vitally interested in Australia's war effort. Don't assist them by discussing what you know about the manufacture and storage of munitions.

# Lameness in Lambs

# Due to a Variety of Causes.

J. T. HAYSTON, B.V.Sc., Pastures Protection Boards' Veterinary Research Officer.

LAMENESS in lambs is not a disease; it is merely a symptom of disease and an evidence of pain, and may be due to a variety of causes. Lameness is the manifestation of structural or functional disorder of some part of the locomotory apparatus, characterised by a limping or halting gait. The commonest cause of lameness in lambs is inflammation of the joints of the legs, and of the various types of this condition non-suppurative arthritis is probably the form which is most frequently encountered. Suppurative arthritis, blowfly strike, fractures, dislocations, grass seed injury, foot rot and foot abscess are other causes of lameness.

Non-suppurative arthritis is responsible for lameness in lambs aged up to about three or four months, and is typically seen in lambs about a week or a fortnight after marking. Occasionally the disease is seen in the flock before marking, and it may appear in very young lambs. The breed of sheep or the sex of the lamb does not appear to have any relation to the disease.

## Symptoms of Non-Suppurative Arthritis.

The symptoms of the disease are well defined, and the onset of the disease is usually sudden, so that a number of lambs may be seen to be suffering from lameness in one or more limbs even though they appeared quite normal on the previous day. After several days the lameness becomes still more marked, and examination will reveal tenderness of the joints, with the lamb showing evidence of pain when slight pressure is applied to the affected part.

The joints most frequently affected are the hock, knec, stifle and elbow, and the lamb limps along using the affected limbs as little as possible, showing evidence of pain when weight is placed on them. Examination of the affected joint will show very little enlargement, even though the part is very painful. Lambs with arthritis of both knees will sometimes be seen walking about on the knees rather than on their feet, and as a result of the thickening of the tissues the joints appear much enlarged. Cases have been seen where lambs have continued to move about in this abnormal position for the remainder of their lives.

## Direct and Indirect Losses.

The usual result of the lameness is a disinclination to move or inability to follow the mother about, and consequently the lamb suffers from rapid loss of condition through partial starvation. A large number of lambs are only slightly affected and their symptoms consist of only a slight stiffness, which passes off in a few days. In some few cases the disease is severe and may result in the death of the lamb, or the disease may develop into a chronic form, which leads to a permanent deformity of the limb, and in the case of a stud lamb this is the equivalent of a complete loss. Further loss is experienced by the partial condemnation of carcases of affected lambs forwarded for slaughter. Lameness in lambs is of considerable economic importance, for even when the lambs recover in a few days they receive a serious check in condition from which it takes some time to recover.

When affected joints are opened up it is seen that they are sometimes surrounded by a slightly increased amount of fibrous tissue. A slight excess of synovial (lubricating) fluid may be found within the joint, and usually the smooth surface of the bones of the joint are eroded, leaving a raw ulcerated area. There is no pus in the joints, and this is the distinguishing feature.

## Caused by a Germ.

Non-suppurative arthritis is caused by a specific germ known as Erysipelothrix rhusiopathiae, which, after entering the animal's body, invades the blood stream and then rapidly establishes itself in the joints. The

method of infection is usually by way of the umbilicus (navel cord) or through an unhealed wound (either the tailing or marking wound or one received accidentally). When the disease appeared in unmarked lambs it was assumed that infection had taken place through the umbilicus, and this opinion was supported by experimental work, but cases have been encountered when lameness has appeared despite disinfection of the navel cord and other precautions taken against infection. These outbreaks of the disease remained unexplained until experiment showed that the germs could cause the disease when they gained entrance to the animal's hody by way of the mouth, and, further, that young lambs became lame after cultures of the organism were applied to the intact (unbroken) skin. It should be remembered that while the germ is able to penetrate through the intact skin and cause the disease this does not happen very frequently in the field, and the commonest source of the disease is through the infection of wounds.

## Mark Lambs on Clean Ground.

Non-suppurative arthritis usually results from contamination of wounds following some operation such as marking. The operation should be carried out away from sheepyards and sheep camps. Contaminated soil is an important source of infection and consequently it is useless taking meticulous precautions against infection during operations if the sheep are permitted to return to their old camps. Here the lambs will lie down with the fresh wounds in contact with the hadly infected ground. The ideal is to confine the sheep with a temporary fence to a well-grassed area and to keep them there for several days until wellformed scabs cover the wounds. Prior to marking, the instruments should be sterilised; an antiseptic dressing applied to the wounds will assist in reducing infection and in keeping flies away. These precautions are all that can be reasonably carried out in the field, and, while not completely eliminating all risks of the disease, will materially reduce its incidence.

## Immunisation Not Yet Practicable.

Experimental work has shown that the disease can be prevented by injecting the lambs with immune serum prepared in horses, but under present conditions of

serum production this treatment is not practicable for widespread use on flock sheep. Further work is being carried out on methods of immunising sheep.

Once the disease has developed in lambs there is no treatment which will alleviate the condition or even guarantee recovery. The majority of affected animals will recover completely over the course of a fortnight without any treatment being applied. Rest will do more to assist recovery than anything else.

## SUPPURATIVE ARTHRITIS.

Suppurative arthritis is a type of inflammation of the joints where pus is present in the joint capsule and in the tendon sheaths around the joints. Affected joints are swollen and soft on pressure, are hot and painful, frequently "point" and the pus breaks out. The disease is not caused by any single specific organism, but may be due to any one or a combination of a number of pyogenic (pus-forming) organisms such as staphylococci and Corynebacterium pyogenes. The common source of infection is either through the umbilicus of young lambs or the marking or tailing wounds of older lambs.

The type of lameness is very acute and the lamb is troubled by the affected joints whether it is standing or lying down. It frequently happens that while the organisms seem to have a special affinity for the joints, they also invade the lungs and cause a pneumonia with numerous small abscesses scattered throughout the lung substance. Affected lambs very frequently show abnormal breathing with exaggerated movements of the abdominal walls because of this pneumonia.

## Lamb Usually Dies.

The abscessed joints contain a greyish-yellow, thick creamy pus which frequently has a foul odour. Very little can be done in the way of treatment since there is gross malformation of affected joints and the abscesses are usually scattered throughout the lamb's body. Usually the diseased lamb dies despite all attempts to effect drainage of affected parts, but in rare coses a certain amount of healing takes place; it is unusual for an affected case ever to improve beyond the stage of being a cripple with a permanent deformity of at least one limb.

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## BLACKSMITHING ON THE FARM.

## With Hints on Welding and Tempering.

L. J. Kemp, Overseer of Blacksmithing, Parramatta Gaol.

IN the present time of shortage of skilled assistance, the farmer must be in a position to help himself as much as possible. There are many occasions when breakages occur on the farm, in which a knowledge of working with iron would save a long journey to a tradesman. The following notes on blacksmithing, including welding and tempering, have been written with farmers' needs particularly in mind, and care has been taken to avoid technical terms.

The first section will deal with the equipment necessary to undertake such work—the forge, the fuels and the tools—and subsequent sections will describe the making of welds and the tempering of cast steel.

## The Equipment and Tools.

Since it is necessary that metals are to be heated, the first consideration is that of forges. Some farmers, no doubt, will have a torge that is blasted by bellows; this type is quite good, and can be used to advantage, but to those who may acquire new equipment the non-framed forge with a geared fan blower attached is recommended for reasons of service and portability. Many types and designs of forges can be purchased, but in making a selection always ensure that the forge has a unit which can produce a good strong blast.

ing with it. Charcoal is useful and makes a good welding fire.

A forge fire, made in the following manner and known as the "packed fire" (Fig. 1) has many advantages. First make a small fire, then bank up the sides and back with damp coal, tamp down evenly with a forge spade, leaving the front of the fire about level with the top of the forge Then in the centre of the pack add coke or charcoal. When the fire burns down, do not break up the banking, but place more fuel (coke or charcoal) in the centre of the fire.

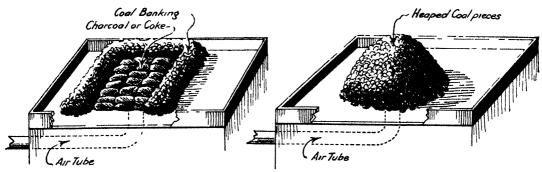


Fig. 1 .- Diagram of a "Packed" Furnace Fire.

#### Fuels and Fires.

The fuel to be used will depend principally on local conditions. Small sea coal is recommended where available an l is generally used and favoured by the majority of experienced blacksmiths. Hard furnace coke is very good, and produces the greatest heat of all fuels if broken up to small pieces; no difficulty will be found to smith-

Fig. 2.—Diagram of a Furnace Fire for Coal Only.

If coal only is used, mound the fire as shown in Fig. 2.

Blow until flames are prominent, then loosen the fire with the poker and allow to stand for few minutes. Then rake off the surplus coke, which is known as soft coke, and makes an excellent welding fire.

Greater heat can be expected from a small fire. Sprinkle the fire with water to keep it

small when it shows a tendency to spread. After the fire has been in use for some time it will be found that a conglomerate mass has formed in the bottom. This is known as clinker. Do not attempt to weld until all clinker has been removed.

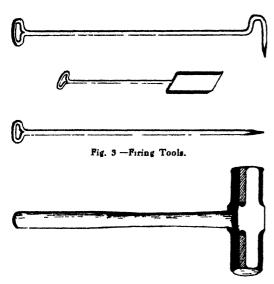


Fig. 4.-A Double-headed Sledge Hammer.



Fig. 5. - A Ball-pein Hammer.

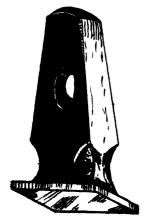


Fig 6 .- A Flatter.

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Fig. 7 .- A Fuller.

Firing tools to be used with the forge consist of a poker, spade and rakes (see Fig. 3). These tools should be made to a size consistent with the type of forge in use,

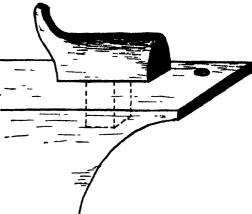


Fig. 8.-A Bottom Fuller.

and not too heavy; 1/2 inch round iron is suggested for making handles. No difficulty will be found in forging to shape as shown in the illustration.

#### Blacksmiths' Tools.

Tools are a very necessary part of the equipment that a blacksmith must have, if dependable results are to be achieved. The following tools will be found necessary:



Fig. 9 .- A Cold Set.

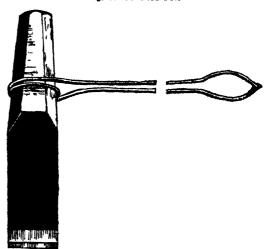


Fig. 10 .- A Hot Set.

### APRIL 1, 1942.]

A double-headed sledge hammer, which should be about 12 lb. in weight (Fig 4). This is used for the very heavy work such as drawing down hot irons and striking upon forging tools.

A ball-pein hammer (Fig. 5). This type of hammer is always used by smiths for general use. The weight should be about 2 lb.

A flatter (Fig. 6). This tools is used for flattening out and dressing up hot irons.

A fuller (Fig. 7); used for fullering and chamfering hot irons.

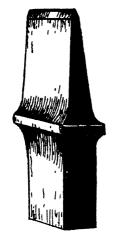


Fig. 11 .- A Hardie



Fig. 12.-A Top Swage.

#### [THE AGRICULTURAL GAZETTE.

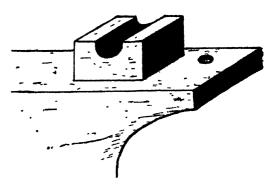
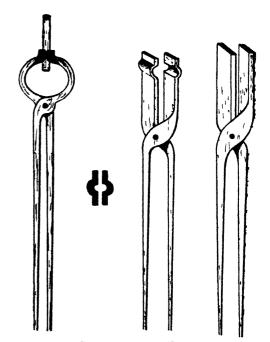


Fig. 13 .- A Bottom Swage.



Figs. 14, 15, 16.-Tongs.

A bottom fuller (Fig. 8); this is used in conjunction with the tool shown in Fig. 7 for work such as forging down strap bolts, etc.

A cold set (Fig. 9) is used for cutting up cold bars of iron, rods, etc. A hot set (Fig. 10) is very similar to the cold set, but much more tapered for the purpose of cutting off hot irons.

A hardie (Fig. 11) fits in the anvil, and is very useful for the smith who is without a striker. It is used for cutting off either hot or cold bars.

A top swage (Fig. 12) is used for drawing down hot irons. Bottom swages (Fig. 13) are also needed for some types of drawing down work.

Tongs. The operator will need several pairs of tongs. Fig. 11 shows a pair known as hollow-bits. They are used for holding pieces of hot round iron. Fig. 15 is a pair of link tongs, and, as the illustration shows, these are designed for holding hot links. Fig. 10 shows a pair of flat tongs. These three pairs of tongs should be sufficient for the general lines of repair which farmers may attempt.

### To Heat Iron in the Forge Fire.

The irons to be heated should be placed in the fire about parallel with the top of the forge, and just under the top layer of coals. Experience has proved that the hottest part of the fire is not at the bottom. Care should be taken to avoid digging the irons in the fire, as this method produces very slow heating, and has a tendency to dirty the irons if a welding heat is being attempted.

(To be continued.)

## The Value of Oats for Feeding Poultry.

IN other countries the use of oats as a poultry feed, both whole and gristed, is much more extensive than is the case here. In Britain, oats are commonly used as part of the grain fed to poultry: the well-known Sussex ground oats are an important ingredient in the mash portion of the rations, not only for fattening poultry, but also for growing stock and adult birds.

In view of this, the question naturally arises: "Why is the consumption of oats by poultry in this country so limited?"

The explanation is that most of the varieties of oats grown here are not suitable for poultry, being too thin and thus having too great a proportion of fibre. Moreover, the price is mostly higher than that of wheat and maize, taking into account the difference in weight per bushel.

## Oats in a Poultry Ration.

If regular supplies of good plump oats were available at price levels comparable with wheat, there is no doubt that poultry farmers here could be encouraged to use much larger quantities than at present. Oats could form at least one-third of the grain portion of the ration for adult birds, in conjunction with wheat and maize, and on this basis the quantity which could be fed as grain annually would amount to approximately 1,350,000 bushels (40 lb. per bushel).

In addition, further supplies could be utilised in the form of oaten pollard or ground oats. These products could be incorporated in the mash in place of pollard to the extent of at least 50 per cent., if the price rendered their use economic. In this way there would be a possibility of a further outlet for another 1.500,000 bushels of grain.

#### Hull-less Oats.

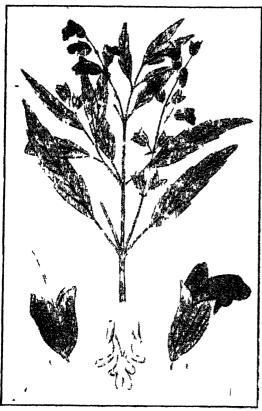
The poultry industry could also absorb fairly large quantities of hull-less oats for chicken feeding if they could be sold at a price not much in excess of wheat. In this case, too, it would be essential to have regular supplies available, and it might take a few years to work up to a maximum demand, as poultry farmers at present are not accustomed to the use of hull-less oats, owing to the limited quantity available.

To sum up the position with regard to the possible use of oats and oat products in the poultry industry, it must be realised that under past and present conditions the most economic foodstuffs for poultry have been and are wheat and wheat products; while suitable oats would provide a valuable addition to the diet of poultry, the price factor together with quality are the chief considerations in creating a market for large quantities of this cereal.

War Gossip is Dangerous.

Guard Your Tongue.

## MINT WEED PROCLAIMED NOXIOUS.



Mint Weed.

### Poisonous to Stock.

A. PEARSON, H.D.A., Weeds Officer.

MINT WEED (Salvia reflexa), a troublesome pest with poisonous properties, was recently proclaimed noxious in all municipalities and shires in New South Wales.

This weed, a native of United States of America and Mexico, has been naturalised in Queensland for a number of years, being troublesome on the Darling Downs area. It has in recent years made its appearance in four or five of the north-western shires of New South Wales, and unless prompt action is taken by all landholders to stamp it out it can be expected to cause serious trouble in the future.

It is an erect, summer growing annual with small blue or lilac coloured flowers. Flowering can occur from the time the plant is only two or three inches high, and last year in New South Wales two crops were actually produced. When crushed the whole plant has a strong sage-like odour.

Mint Weed is possonous, tests showing that 2 lb of dry material killed a sheep and young bovine in three days. Stock reared on mint weed areas do not touch it, but strange stock will graze the weed with fatal results.

It is an annual, and consequently can be eradicated by continued prevention of seeding.

## Lengths of Drills in an Acre.

The following table shows the total length of drills of varying widths from 12 inches to 36 inches contained in 1 acre —

Width.	Length of drill.		Width.	Lengtl	of	drill.	Width	Lengtl	a of	drıll	
ins. 12 15 16 18 19 20 21	yds. 14,520 11,616 10,890 9,680 9,170 8,712 8,297 7,920	ft. 0 0 0 0 1 0 0 0	ins	ins. 23 24 25 26 27 28 29	yds. 7,575 7,260 6,969 6,701 6,453 6,222 6,008	ft. 1 0 1 1 1 2 0	in  111 0  91 72  0  7 10	ins. 30 31 32 33 34 35 36	yds. 5,808 5,620 5,445 5,280 5,124 4,978 4,840	ft 0 1 0 0 0 2 0 0	ins 0 111 0 0 111 10 0 0

A useful rule for finding the total length of drills in an acre is to take the number 174,240 and divide it by the width of the drill in inches. The result gives the length of drill in yards. Thus if you want to find the total length of 27 inch drills in 1 acre, divide 174,240 by 27. The result is 6,453}, which means that 6,453 yards 1 foot is the length required.

—Scottish Farmer Album, 1940.

## An Advantage to Brand Stock Which is to be Moved.

#### HOW TO OBTAIN A REGISTERED BRAND.

REGISTRATION of brands for large stock (cattle, horses, etc.) is not compulsory, but voluntary registration is provided for under the Registration of Stock Brands Act, 1921. The value of registered brands for identification purposes is readily obvious, particularly when stock are moved.

About 70,000 brands are registered, the number having been augmented considerably during the last few months as a result of the discussions which have been held in regard to stock evacuation.

The procedure for securing registration is to apply to the Registrar of Brands, Department of Agriculture, Sydney, or the office of any Pasture Protection Board. Brands are allotted by the Registrar; in all cases they are made to conform as nearly as possible to the wishes of the applicant.

There is a minimum charge of 10s. for up to twenty head of stock and a graduated scale applies for larger numbers. The size of brands is prescribed, with a minimum of 1½ inches and a maximum of 3 inches for each letter, character or figure.

Branding is to be done in a regular order in prescribed positions—the rump, hip and thigh for cattle, and shoulder, thigh and neck for horses. This provides six positions for cattle and five positions for horses. The left neck of horses is excluded.

Offences against provisions of the Act are regarded legally in a serious light, and heavy penalties are provided for wrongful use of brands.

## Add Lime to Cereal Ration for Sheep.

A ration consisting mainly of cereals and their by-products is inadequate for sheep feeding. In an experiment carried out by the Council for Scientific and Industrial Research almost all of a group of ewes and their lambs died when fed for a period of about 27 months on a ration containing wheaten chaff (44 parts), bran (25 parts), oats (25 parts), linseed (5 parts) and common salt (1 part). Apart from the high mortality, the sheep in this group showed a general falling off in body condition, they failed to develop and made poor wool growth. Teeth development was subnormal in the lambs and the only one which survived the 27 months' trial had no permanent teeth. The same ration plus one per cent, finely ground limestone (culcum carbonate) was fed to a similar group of ewes and their lambs and none of the previous-mentioned defects was noticeable; only one sheep died.

These results should not discourage feeding of cereals to sheep, but rather do they emphasise the importance of adding lime to a cereal ration. This applies not only to sheep being fed under drought conditions, but also to stud sheep, which are often given a generous allowance of cereal grains.

The experimental sheep were deprived of any food other than the ration supplied, whereas in practice paddock-fed sheep would generally have access to some natural feed which would go far to counteract the effects of an all-cereal ration.

Clovers or lucerne, either as hay or silage, will do much to correct the deficiency of lime, but if these fodders are not available one per cent. of finely ground limestone should be mixed with an equal quantity of salt and used as a lick. If the sheep do not take it readily a small quantity of molasses will make the lick more palatable.

## Vegetable Share Farmers Required for Murrumbidgee Irrigation Area.

THERE are at present a number of vacancies on the Murrumbidgee Irrigation Area for share farmers who have had experience in vegetable growing.

Experienced growers from less favoured areas might welcome the opportunity of transfer to the Irrigation Area, where suitable soils and ample supplies of water make vegetable production a very attractive proposition. The attractiveness of the proposition is still further enhanced by

the fact that growers may now obtain contracts with the Defence Food Control Directorate for the supply of vegetables at fixed prices.

Farmers with the necessary experience in vegetable growing and who are desirous of undertaking share farming on the Irrigation Area are asked to get in touch with the Division of Plant Industry. Department of Agriculture, Box 36x. G P.O., Sydney.

The Superior Value Meggitt's"

has been

## BY RES OVE

For many years Meggitt's Pure Linseed Sucep Nuts and Meggitt's Linseed Oil Meal have Nuts and Meggitt's Linssed Oil Meal have found first place in the rations of leading stock owners because of the uniformly satisfactory and economical results obtained from their use. They are rich in digestible protein and they contain 6% of Medicinal Linssed Oil, the laxative effect of which is supplemented by their content of vegetable mucilage.

In the feeding of sheep, Meggitt's Linseed Sheep Nuts combine to a degree possessed by no other feed, the qualities necessary in a supplement to dry fibrous pastures, etc. A relatively light ration of "Meggitt's" will keep the digestive system in good order, minimising losses from troubles such as impaction, and enabling sheep to make the maximum use of the natural feed.

For ewes with lamb at foot on dry feed about 4-ozs. of "Meggitt's" per day is adequate to reduce mortalities at lambing and make it possible for the ewe to produce sufficient milk to rear a healthy lamb. For dry sheep a lighter ration is usually sufficient to maintain the flock in stronger, healthier condition, and to produce a sounder and heavier fleece.

In the feeding of dairy cows, calves, pigs, beef stock, etc., Maggitt's Linseed Oil Meal is equally as valuable and gives equally as outstanding results. When preparing stock for Show or sale it is used by the majority of leading breeders as is shown by the fact that at the last 5 B.A.S. Shows (Sydney) over 96% of the prisewinning Beef and Dairy Stock were fed this product. All classes of stock owners throughout Australia feed "Meggitt's" to give them better and more profitable results, whether those results be in the form of increased milh yields or of a quicker grown, better finished carcass. carcass.

Stock owners requiring information on feeding, can obtain free literature and ration advice by writing to Meggitt Limited (address below).

#### AMPLE SUPPLIES.

Ample supplies of Meggitt's Pure Linseed Sheep Nuts and Linseed Oll Meal are available through Produce Merchants, General Stores, Stock and Station Agents, Butter Factories, or direct through Meggitt Limited.

# ED C EED

Manufactured from Pure Linseed from which portion of the oil has been extracted by hydraulic pressure only.

MEGGITT LIMITED, HEAD OFFICE: 67 YORK STREET, SYDNEY. Works: PARRAMATTA-MELBOURNE-ADELAIDE. Box 1555 E, G.P.O., SYDNEY.



incorporating modern scientific methods for Milk and Cream production in totally enclosed conditions, under continuous

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vacuum, with absolute freedom from the contaminating influences of flies, dust, shed odours, and contact of operators.

Cools and automatically deodorises the Milk or Cream of feed and other undesirable odours liberated at blood heat.

## COW TO CAN ... UNDER VACUUM !!

## TO PIG FARMERS AND POULTRYMEN—

For Sturdy Stock and Big Returns



# USE IMPERIAL PRODUCTS

- **★ Bovina**
- **★**Meat Meal
- **★ Eggshello**

Standardised Analysis: — 47/50% Proteins. 30/33% Minerals. 8% Moisture.

Guaranteed Analysis:—Minimum Crude Protein 60%. Minimum Crude Fat 9%. Moisture 8%.

Guaranteed Analysis:—Moisture 5.4%. Protein 8.5%. Fat 1.5%. Minerals 86%.

## Obtainable from-

- Riverstone Meat Co. Pty. Ltd., 5 O'Connell Street, Sydney.
- Redbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- W. Angliss & Co. (Aust.) Pty. Ltd.,
   42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Creek, Bookhampton.



## CULLING THE DAIRY HERD.

#### Several Factors to be Considered.

A. C SMALL, H.D.D., Special Dairy Instructor

IN addition to the productive capacity of the cows in a herd there are numbers of what might be called "economic qualities" which must be taken into consideration when culling, and these can be conveniently grouped, under the following headings:—
(1) Capacity to gather food; (2) effort required at milking time; (3) temperament; and (4) breeding characteristics.

#### Capacity to Gather Food.

The capacity of a cow to gather food is limited by the shape of her jaw and her ability to walk about when in full milk.

A "pig jaw" in a cow is often an inherent

A "pig jaw" in a cow is often an inherent quality, passed on from either the dam or the bull, and when this feature is recognised and its origin is traced, it is, when sufficiently pronounced, enough evidence to cull the animal, and in some cases, the parent from whom the defect originated. The jaw should be broad, low and squarely set, so that each bite will mow with ease the maximum amount of fodder.

Capacity to gather food is also controlled by ability of the cow to walk about, which is restricted by:—

(a) The soundness of the feet and legs. Sometimes weaknesses in these regions are inherent, and sometimes they develop in the animal. When the weakness is inherent, and is, in the opinion of the breeder, of sufficient magnitude to restrict the walking activity of the cow, it may become necessary to cull the cow, and in addition, the parent, which transmitted the defect.

(b) A low pendulous udder.—A low, pendulous udder restricts walking, because of its swinging movement, and in some cases, by the injury which the udder receives from bumping against the hind

(c) Insufficient separation between the hocks.— The hocks of a cow should point slightly outwards, and they should be widely separated, leaving plenty of space for the udder. The position of the hocks is governed largely by the ratio of the spaces between the two hip bones and the two pin bones. Hip bones set widely apart with pin bones set comparatively close together, usually results in the hind legs being placed close to each other, which leaves restricted space for the udder. When a cow of this conformation walks with a full udder of milk, chasing occurs and soreness is caused. The treatment which necessarily must follow, combined with a reduction in the quantity of food gathered as a result of restricted movement from soreness, causes the milk flow to decline in accordance with the severity of the defect.

#### Ease of Milking.

The principal factors which influence the effort that has to be exerted to milk the cow are: (1) the size of the teat; (2) shape and attachment of the udder; (3) condition of the muscles which surround the teat canal

Short teats cause the milking operation to be unduly prolonged when the work is done by hand, and sometimes expertness and patience are required to completely remove the milk from the udder. Failure to "strip" the udder completely may cause mammitis to develop, or the premature "drying off" of the cow, thereby reducing its economic value through the cost of treatment and

loss of production. In addition, there is always a danger of germs of this disease spreading to

healthy animals.

Much the same risk exists, and extra effort is required when the udder is pendulous and is carried close to the ground; also when the muscles surrounding the teats are firm, causing the cow to be "tough and "leathery." In order that the milking operation can be carried out with maximum comfort and with a minimum amount of effort, it is necessary to have the udder sufficiently elevated that the top rim of the bucket,

# DIPPING FEES On Stock Leaving Tick Quarantine Areas For Clean Country.

The Minister for Agriculture and Forests (Captain the Hon W. F. Dunn, M.L.A.) announces that, after full consideration of the matter, he has decided to abolish the dipping fees charged on stock leaving the Tick Quarantine Areas for clean country, and on any stock that may be evacuated from the Tick Quarantine Areas. The Minister points out, however, that it is not proposed to abolish the dipping fees on cattle introduced into New South Wales at the Queensland border

when placed in position between the knees and the milker in a sitting position, is lower than

the teats of the cow.

With this elevation, a long, broad udder is necessary to give the required size for the production of a large quantity of milk. A long udder is practically always associated with a comparatively long space between the hip and pin bones, and a broad udder is likewise associated with the space between the two hip bones. Breadth between the hip bones gives the animal a broad back, with a correspondingly broad area of belly in the locality of the udder. The shape of the udder which is most desired in a dairy cow is one which hinders movement of the animal to the least degree, can be handled with ease, and is of sufficient size to produce a large quantity of milk; such an udder is long and broad, and does not fall unduly low from the belly.

Temperament.

Some cows are naturally aggressive, while others are timed. The aggressive beast is a menace in the assembly yard and may cause considerable injury to other cows which would involve the owner in financial loss through loss of time in treating the injured animals, cost of medical supplies used, and depletion of yield from affected animals.

In the majority of cases the most profitable remedy is to dispose of the offending animal, but in others, a satisfactory solution is to be found in de-horning. The main objection raised to de-horning is that the appearance of the herd is somewhat spoilt. In the commercial herd this factor should not be taken into account, because the principal objective is milk and butter fat

yield, and show value is negligible. In the case of pure bred stud book herds, objections have been raised to this practice, but these cattle represent a very small percentage of the milking cows in the dairy herds, and because of the handling and care which they receive from birth, they are, one the whole, much less aggressive in the yard and respond more readily to the process of "breaking in" than is the case with grade cows.

The timid beast causes less damage in a herd than the aggressive animal, but at the same time, its presence in the herd is a disturbing factor which causes loss of production. Some animals will, at the sight of any unusual object or movement, cause a mild stampede, in which injury is likely to occur to the most docile beast in the herd through violent contact with other animals or through being rammed on to wire or other fencing material

Both aggressiveness and timidity are hereditary qualities, and in culling on account of these defects, it may be advisable to remove more than one member of a family from the herd.

#### BULL BANKS.

#### Suggested War Emergency Measure.

WAR emergency might well interfere with the continuity of studs and heids of vital importance to our cattle industry. We must not allow any of our blood strains to be lost. Our cattle associations could take action on simple lines to prevent any such happening.

Bull farms could be established, where yearling bulls could be reared and held in reserve for our dairying industries. This has been done as a peace-time measure in some countries—it being appreciated that bulls that are well bred and well reared are of more value as stock getters.

Whilst most stud breeders will make

Whilst most stud breeders will make necessary arrangements to transfer heifers on agistment, the task of saving all their bulls, or even a percentage of same, pre-

sents many difficulties

It is only by the establishment of such farms, subsidised if necessary by the Government, that we can hope, in the event of any war emergency, to maintain those lines of blood which will be invaluable, not only for our own reconstruction, but also for rebuilding herds that have been wiped out mother countries.—C G F. Grant, Herd master.

#### Breeding Characteristics.

Other information which should be readily accessible when assessing the economic value of a cow in the herd are the service record and a production record to indicate the time when the cow ceases to be a profitable unit.

cow ceases to be a profitable unit.

If a cow has been served on three occasions and is still not in calf, it is advisable to endeavour to locate the cause, and if possible, remedy it. If, after treatment, the animal requires more than

two services to get her in calf, she should be culled if she is a heifer, unless, of course, she has some special qualities which would justify persevering with further treatment. A heifer which is difficult to get in calf is usually more costly to maintain than one which goes in calf at one service, hecause during the period of mating, heifers are usually located with the milking herd for observation purposes, and are consuming the choice grazing which has been provided for these cows. Such grazing is not needed in the case of a cow that has only to maintain normal growth and development without production of milk.

In addition, an animal which is continually coming on heat is a distinct nuisance on a dairy farm, because she is a disturbing factor to the rest of the cows and may be responsible for reduced yield, and in some cases, injury. The entering up of service dates on a suitably ruled sheet readily reveals any abnormality, and losses from this cause can then be eliminated with the least possible delay.

The stage at which the usefulness of a cow is finished is not determined by actual age. Some cows have achieved their greatest production when more than ten years of age; yet many cows decline in production to the unprofitable point long before reaching this age. The decline may be due to such causes as the incidence of disease, such as mammitis or the loss of teeth. The work involved in keeping a production, breeding and lustory record of each cow is more of a recreation than a labour to the enthusiastic dairyman, and as time goes on, stimulates general interest in the operations of the farm

## Dairying at Nyngan.

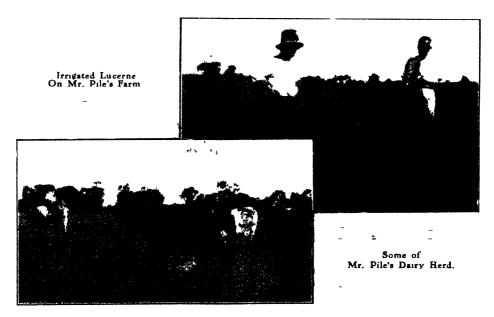
## The Value of Irrigated Lucerne.

J. W. G. SMITH, HDD, Senior Dairy Instructor.

MORE farms should make use of irrigation plants to grow lucerne as food for dairy cows on the flats of the western rivers—especially dairymen supplying milk to the towns. The excellent returns obtained by Mr. A. A. Pile, of Nyngan (one of the hot towns of the western plains)

giving  $42^{1}$ , gallons of milk per day, or an average of  $2\frac{1}{2}$  gallons each. The herd is a grade one, of big-framed cows in excellent condition

At the present a big body of water is available in the river and it is used to good advantage. A well has been sunk about 20 yards from the



over an area of 6 acres on the bank of the Bogan River, indicate what can be expected when water is supplied to crops on such land. There are twenty-five cows and fifteen heifers in this herd, and also three horses on the property. An average of seventeen cows is milked all the year round, and at the time of my visit they were

river and a channel cut to allow the water to flow in. A 6-inch pump, tractor driven, and supplying 65,000 gallons per hour, delivers water to an underground reservoir situated on a rise, from whence it flows in drains around the plot of lucerne, which is flooded in small areas Each plot of approximately half an acre is flooded

continuously for 3 hours at the most, twice a month.

The lucerne was sown in fallow at 4 lb. per acre with a crop of oats, superphosphate being used at ½ cwt per acre

Rotational grazing of small areas is practised, the animals being controlled and not allowed to wander, and when the growth becomes too vigorous the crop is cut.

Mr. Pile is a keen advocate of the use of farmyard manure, and regularly each winter when the lucerne is dormant, he top-dresses the area at the rate of 4 tons to the acre.

## To Prevent Sandbags, Sacks and Hessian from Rotting.

A SIMPLE method of rot proofing saud bags, sacks and hessian is described by Dr. C. J. Magee, Acting Chief Biologist of the Department of Agriculture.

The treatment consists of dipping the bags in a preserving solution, wringing and drying them. (For use on the farm, about one-eighth or one-quarter of the quantities given below should be ample.)

The method is as follows:-

Dissolve to lb of bluestone (copper sulphate) in 35 gallons of water in a wooden vessel—not one of iron or galvanised from Lither put the crystals in a hag and suspend it just below the surface of the water overnight, or dump the hag up and down in a few gallons of hot water until dissolved, and make up to 35 gallons.

Dissolve separately in another vessel 11½ lb. of washing soda crystals (or 4½ lb. of soda ash) in 5 gallons of water.

Then, while stirring, add the soda solution slowly to the bluestone solution. Add a wetting agent, for example, Wetsit or Agral 3, and stir the nuxture well. (If a wetting agent is not procurable, merely increase the time of treatment.)

Immerse the sandbags one by one until the fabric and stitching thread are thoroughly wet, which may take up to five minutes. Also dip the twine which will be later used for sewing the bags. Take out the bags and remove the excess liquid by tunning through a clothes wringer or mangle. The bags are then ready for immediate use or they may be dried and stored.

Other copper compounds, e g,, Redispersible Copper Oxychloride (available from Imperial Chemical Industries Ltd. or Messrs. Elliot and Australian Drug Pty. Ltd.), may be used, although the Department of Agriculture has not field-tested these compounds as thoroughly as the above mixture

## Selected Citrus Buds.

## The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient finits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1941 budding season, trees from which should be available for planting during the 1942 season:—

	Washing ton Navel	Valencia Late.	Marsh Grapefruit	Eureka Lemon.	Lisbon Lemon.	Emperor Mandarin.	Total
Adamson, I	4,000 3,500 3,000 5,000 1,000 2,500 1,500 10,000  3 500 5,000	4,000 5,000 3,000 5,000 1,500 2,500 1,000 15,000 2,000	 1,000   2,000  750 1,000	2,000 3,000 3,000 2,000 500  1,000 5,000 2,000 1,000	 1,000   1,000 1,000  250 1,000	   800  800	10,000 11,500 10,000 13,000 3,000 5,000 4,500 33,800 2,000 10,000 10,800

## Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address,		Expiry. Date.	Owner and Address.	Number Tested.	Expiry Date.
		1942.			¥0.0
A. E. Liggins, "St. Leger Dairy," Kuring-gai		*942	Segenhoe Estates, Scope	65	31 Oct.
Chase Road, Turramurra North	45	6 April.	Lunacy Department, Gladesville Mental	"	32 200
Frangie Experiment Farm, Trangie	94	7 ,	Hospital	22	14 Nov
Berry Training Farm, Berry	x88	7 "	Bathurst Experiment Farm (Ayrchires)	21	ıš ,,
Forster and Sons, Abington, Armidale (Jerseys)	58		W. W. Martin, "Narooma," Urana Road,	1	1
J. I. Toohey, "Mandemar," Berrima	56	8 ,,	Wagga	150	29 ,,
N. L. Forster, Abington, Armidale (Aberdeen	_		A. G. Wilson, Exeter (Jerseys)	68	29 ,,
Angus)	182	8 ,,		1	1
The William Thompson Masonic School,		l i		1 :	1943.
Baulkham Hills	51	24 "	Lunacy Department, Callan Park Mental		
G. T. Reid, "Narrangullen," Yass	169	15 "	Hospital	29	9 Jan.
Miss N. C. Brenan, Arrankamp, Bowrai	23	15 ,,	Lunacy Department, Parramatta Mental		6 Feb
Wagga Experiment Farm (Jerseys)	50 56	-0 "	The Sydney Church of England Grammar	31	o red
9 9197.4 1117 Clare in \$6	93	"	Colored Manager		6
Emu Plains Prison Farm	110	1 1	The day Illiana Cabaal Mana State	55 17	
G. M. Edwards, Uralla	3	22 ,,	Kovong School, Moss Vale	2	6
B. N. Coote, Auburn Vale Road, Inverell	30	22 ,	New England Guls' Grammar School, Armidale		2 "
N. East, Gum Flat Road, Inverell	41	22 ,,	A. E. Stace, Taylor Street, Armidale	31	7
V. Boland, "Seaton," Inverell	14	28 ,,	New England University College, Armidale	13	I Mai
E. D. Hordern, Cabramatta (A.I.S.)	97	29 ,,	A. C. O'Dea, Perry Street, Dundas	28	19 ,,
Limond Bros., Morisset	56	30 ,,	Lunacy Department, Morisset Mental Hospital		25
St. Michael's Orphanage, Baulkham Hills	21	31 "	R. C. Dixon, Elwatan, Castle Hill (Jerseys)		3 Ap
G. H. Newman, "Bunnigalore," Belanglo, via		J- "	Liverpool State Hospital and Home	102	10 ,,
Sutton Forest	19	15 May.	H. F. White, Baid Blair, Guyra (Aberdeen		,
Farrer Memorial Agricultural High School,			Angus)	137	26 ,
Nemingha		17	F. C. Harcombe, Hillcrest Farm, Warialda	-37	-
C. Brownlaw, Gol Gol	34	26 ,,	Road, Inverell	32	15 Ma
New England Experiment Farm, Glen Innes	1	1	A. N. De Fraine, Reservoir Hill, Inverell	22	15 ,,
(Jerseys)	64	27 ,,	Sir F. H. Stewart, Dundas	6	30 ,,
Lidcombe State Hospital and Home	146	zz June.	Cowra Experiment Farm	41	27 Jun
E. L. Killen, "Pine Park," Mumbil	201	20 ,,	Kahlua Pastoral Co., "Kahlua," Coolac	314	ro Jul
A. D. Frater, Inverell	104	23 ,,	W. Budden, "Hunter View," Kayuga Road,	1 _	1 .
Lunacy Department, Rydaimere Mental		1	Muswellbrook	18	5 Au
Hospital	48	27 "	W. Williams, Dunreath, Inverell	32	29 "
r. J. Wilks. "Oaks Farm," Muswellbrook	45	28 ,,	Navua Ltd., Grose Wold, via Richmond		
W. S. Grant, Braidwood	14	14 July.	(Jerseys)	113	4 Sep
A. Hannaford Wastman	24	14 "	Australian Missionary College, Cooranbong	113	8 ,,
St. Vincent's Boys' Home, Westmead	19	19 ,,	Department of Education, Gosford Farm		-
Hurlstone Agricultural High School, Glenfield W. Turnbull, "Riverview," Muswellbrook	33 66	26 ,,	A 7 Tames 4 Thamban 12 Massau 17hansle	40	29 ,,
Peel River Land and Mineral Co., Tamworth		5 Aug.	Barnardo Farm School, Mowbray Park	46	13 Oct
/D / O1		8 Aug.	Lunacy Department, Kenmore Mental Hospital	108	5 No
(Beer Snorthorns)	210	26 Sept.	Wallandhan Damadanan Banan	112	A Dec
F. and C. Ryall, 5 Western Avenue, West		av Sept.	CALA TINILAN ATOMO TO SEE TO SE	10	
Wollongong	57	I Oct.	State Penitentiary, Long Bay	10	9 "
W. J. Stephenson, "Hill View," Fig Tree	1 22		1	ł	194
W. C. Wyatt, Sherwood Road, Merrylands		10 ,,	Department of Education, Yanco Agricultural	d	.94
Shaman Bros., Inverell	25	17 "	High School	1 -	6 Feb
Hawkesbury Agricultural College, Richmond		-/	Riverina Welfare Farm, Yanco	74	6 ,,
(Jerseys)	128	18 ,,	St. Ignatius College, Riverview	25	27 ,,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook. Municipality of Queanbeyan.

MAX HENRY, Chief of Division of Animal Industry.

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## Brucellosis-free Herd Scheme (Swine).

### LIST OF ACCREDITED HERDS.

The following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Registered

Allard, S. R., Cleobury Stud, Werombie Road, via Camden.

Bathurst Experiment Farm, Bathurst.

Campbell, D., Hillaugrove, "Wainberal," via Gosford.

Chapman, G. E. and Son, "Illabo Park," Alectown.

Cocks, F. D., "Condalarra," Gooloogong.

Cowra Experiment Farm, Cowra.

Croft, F., Lugwardine, Kentucky.

Draper R. B., "Glengar," Capertee.

Rade, E. M., "Eade Vale," Euchareena.

Farrer Memorial Agricultural High School, Nemingha.

Folev, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.

Genge, J. I., "Springfield," Eugowra.

Grafton Experiment Farm, Grafton

Grafton Experiment

Fennant Hills.

Hawkesbury Agricultural College, Richmond.

Hennessey, J., Pacific Stud Piggery, Holgate.

Holland, A. L. Argonne, Tubb.il.
Liverpool State Hospital and Home, Liverpool.
Maybin, N. C., Towac, Orange
Macarthur (Juhn' Memorial Agricultural High School, Glenfield.
McCaughey Memorial Agricultural High School, Yanco.
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F., "Camelot," Penrith.
Smith, I. M., Eulo Glen, Urana.
Stewart, Sur Frederick, "St. Cloud" Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell.
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollougbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aftorestation Camp, Mannus.
Callan Park Mental Hospital, Callar Park, Rozelle.
Croft, H. M., "Salisbury Coart," Uralla
Emu Plains Prison Farm, Emu Plains.
Glen Innes Prison Camp, Glen Innes.
Geoford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Konmore, via Goulburn.
Masters and Upston, Whitmore Stud Farm, Wamberal, via

Morisset Mental Hospital, Morisset.
Oberon Prison Camp, Oberon.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V, Marata, Harrow Road, Glenfield.
Punnett, R. S., Brawlin.
Smith, C. W J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

## Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Bathurst Experiment Farm (Ayrshires)	Owner and Address.	Number in herd.		Number in herd.
McEachern, H., Tarcutta (Red Po'l) 9 McSweeney, W. J., "The Rivers," Canowindra (Jerseys) 51  MoSweeney, W. J., "The Rivers," Canowindra (Jerseys) 7	Rauerle, P. A., Holbrook Bush, W., Ben Lomond Carrick, G., 'Clonlea," Central Tilba Cowra Experiment "arm (Ayrshires) Curtis, A., Meryla, Movren Department of Education—Farm Home for Boys, Gosford Department of Education—Farm Home for Boys, Mittagong Dixson, R. C., 'Eiwatan," Castle Hill Edwards, G. M., "Rothwick," Uralla (Jerseys) Fairbridge Farm School, Molong Farrer Memorial Agricultural High School, Nemingha Forster and Sons, Abington, Armidale (Jerseys) Forster, N. L., Abington, Armidale (Aberdeen-Angus). Hicks, A. A., Estate, Culcairn Hill, E. Pritchard, Bowling Alley Pt. (Jerseys) Hordern, E. D., Cabramatia (A.I.S.) Hurlstone Agricultural High School Glenfield Kenmore Mental Hospital, Kenmore Killen, R. L., "Pine Park," Mumbil Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus) McEachern, H., Tarcutta' (Red Po'l)	36 44 35 40 38 24 4 27 68 174 43 100 95 58 100 202 48 9	Shorthorns) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital	31 150 63 132 97 12 60 120 171 38 57 82 30 66 68 88

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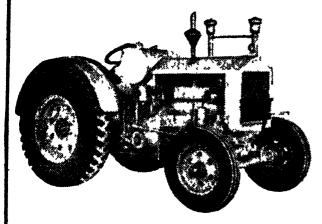
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## Approved Seed.

## April, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fce indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied regarding it to inquirers.

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## Cool Storage of Granny Smith Apples

## Without Oil Wraps.

## The Problem of Superficial Scald.

THE changed circumstances which have arisen due to war conditions have affected the utilisation of storage facilities and methods of storing apples. This applies particularly to the control of superficial scald in Granny Smith apples, since there is uncertainty regarding supplies of oil wraps. The Department of Agriculture has carried out trials at Bathurst and Batlow to obtain information as to the development of superficial scald after various periods of storage in fruit not oil-wrapped, and it is apparent that such fruit cannot be stored after the end of August without danger of scald development during an ex-storage period of twelve days.

## The Trials at Bathurst Experiment Farm.

J. D. BRYDEN, Orchardist.

The investigations at Bathurst Experiment Farm were designed to collect information regarding the development of superficial scald in Granny Smith apples in plain wraps after various periods of cool storage, as an indication of the approximate period during which such fruit could be stored with reasonable safety. Comparisons were made between fruit given prompt storage and fruit given delayed storage, and oil-wrapped fruit was stored as a check.

Fruit of 3-inch size was harvested on 9th April, 1941, and immediately packed—some in plain and some in oil wraps. The colour at harvest was a definite green and

first signs of sweetness were apparent. Starch-iodine tests indicated that the whole of the core area and approximately two-thirds of the cortex area were free of statch.

The finit was forwarded to cool store in equal proportions as follows:—(1) Prompt storage; (2) seven days delay in storing; and (3) fourteen days delay in storing

Storage temperature was 33-34 deg. Fahr., and a number of cases from each lot were removed from store at monthly intervals commencing in June and extending to January. The fruit was examined two days ex-store, and twelve days ex-store, the

period to twelve days representing about the time allowed for disposal under commercial conditions.

The details concerning the development of superficial scald in Granny Smith apples in plain wraps are shown in the table.

Fruit in oil wraps was not affected by scald over the entire period-June to De-

cember, inclusive.

The plain-wrapped fruit of each treatment withdrawn from cold storage on 1st of each month from June to August, inclusive, was free from superficial scald when the final examination was made twelve days later. Scald was in evidence, however, in September, and in most cases became in-

condition as regards crispness, colour and flavour. There was no noticeable difference in the condition between apples in oil wraps and those in plain wraps.

Fruit withdrawn in November, plain wrapped, deteriorated rapidly during the period ex-cool store to twelve days, and fruit taken ex-cool store on 1st December was of poor quality. Apples removed from cold store in November and December, oil wrapped, were superior in every way to fruit which was enclosed in plain wraps.

#### Summary.

The points of importance brought out in these tests were:—

Percentage of Granny Smith Apples Showing Superficial Scald When Cool-Stored in Plain Wraps

		Prompt Storage				7 Days Delav				14 Days Deliy			
Removed From Store	2 days	12 days (x store	Fotal	Amount of Scald.		12 days	Total	Amount of Scald	2 days ex store.	12 days ex store	l lot d	Amount of scald.	
Junc July August September October November December	6 0 3 6 15 8 17 0	2 f 4 42 6 60 9 71 9	30 4 46 2 76 7 88 9	Slight Medium Severe Very Severe	1·2 3 6 12 1 28 0	9 7 24 4 57 8 50 0	10 9 28 0 69 9 78 0	Slight Slight Severe Severe	2 4 18 2	4 8 14 6 42 6 45 1	4 8 14 6 45 0 03 3	Slight Slight Slight Medium,	

creasingly severe as the storage period lengthened. The progressive increase in severity of scald was noticeable in amount as well as in numbers of fruits affected.

Fairly rapid development of scald occurred between the periods two days and twelve days ex-store, the rate being considerably greater in prompt stored fruit as compared with that delayed fourteen days. Apples which had been delayed seven days occupied the intermediate position as regards rate of scald development.

#### Condition of the Fruit.

Excluding those apples which were affected with superficial scald, apples removed from cold storage up to and including October were in excellent to very good

(1) No superficial scald developed in Granny Smith apples in sulphite wraps until four months in cold store at 33-34 deg. Fahr.

(2) As the storage period extended, there was a progressive increase in severity of superficial scald in both amount and numbers of fruit affected.

(3) Delay in storing had a marked influence on scald development in Granny Smith apples.

(4) There was a complete absence of scald in Granny Smith apples stored in oiled wraps for eight months.

I would like to place on record my appreciation of the co-operation of Mr. H. J. Hicks, General Manager of Darks' Ice and Cold Storage Works, Newcastle, in carrying out these tests.

## Storage Experiments at Batlow.

P. B. MACKENZIE, Fruit Inspector.

DURING the 1940 season experiments with Granny Smith apples were carried out in the Batlow district to determine the period in which superficial scald is likely to appear in apples in cold store, or after removal from cold storage, the apples being treated in various ways, but not oil wrapped.

The picking date of all fruit in the tests was 29th April. By this date the fruit had reached the optimum picking stage for

long cold storage. Each apple was approximately 3 inches in diameter.

The treatments of fruit were as follows: (1) Prompt storage—fruit unwrapped; (2) prompt storage—fruit enclosed in plain wraps; (3) delayed storage (14 days)—fruit unwrapped; (4) delayed storage (14 days)—fruit enclosed in plain wraps.

Beginning on 1st June. 1940, and continuing on the first of each month up to the 1st January, 1941, samples of the apples were taken from cold storage. The fruit was examined immediately on removal, two days later, and again fourteen days after removal. The following table gives the first and subsequent appearance of superficial scald on the fruit.

trouble. By referring to the table, it will be seen that a rapid rise in scald development on fruit took place between the September and October withdrawals, and in each subsequent withdrawal 100 per cent. of the apples were affected after fourteen days.

It is therefore necessary that, if Granny Smith apples are to be cool-stored unwrapped or enclosed in plain wraps, they be marketed by the end of August.

For Granny Smith apples to be in a satisfactory condition for storage it is essential to treat the fruit as follows:—

(1) Picking should be carried out when the fruit has reached the right degree of maturity—neither immature nor overmature;

SCALD DEVELOPMENT AT BATTOW

		Fruit	Unwrapj	ped	Fruit in Plun Wraps								
Removed from Cold Storike	Cold store	'a Scild 12 days ex cold store	Total	Amount scald	Cold store	cold store	Iotal	Amount scald					
PROMPT STORAGE													
1st June 1st July 1st August 1st September 1st October 1st November 1st December	Nil Nil Nil 10 56 28	Nil Nil Nil 12 44 72 60	Nil Nil Nil 22 100 100	Medium Medium Very severe Very severe	Nil Nil Nil Nil Nil Nil 24	Nil Nil Nil 4 60 76 68	Nil Nil Nil 4 60 100	Slight Severe Very severe Very severe					
ist January	45*	55	100	Very severe	53*	47	100	Very sever					
st June st July st August st September	Nil   Nil   Nil   8	Nil Nil Nil Nil 8	Nil Nil Nil Nil 16	Slight to	Nil Nil Nil Nil	Nıl Nıl Nıl 4	Nıl Nıl Nıl 4	Slight					
ist October ist November	45 40	55 60	100	Medium to severe Medium to severe	Nıl Nıl	44 100	44 100	Medium to					
st December st January	32* 33*	68 67	100	Medium to severe Medium to severe	36* 32*	62 68	100	severe Medium to severe Medium to severe					

<sup>\*</sup> Some apples showed slight scald immediately on removal from cold store

It will be noted that the first sign of scald appeared on fruit taken from cold storage on 1st September. It appeared on fruit in all treatments. Although there was a difference in the percentage of scald found on fruit which was withdrawn on 1st September, the fact remains that it was present on the fruit, and buyers would be suspicious of any consignments which showed even a small percentage of this

(2) Delayed storage of one week must be practised for fruit produced in "dry" districts, and for two weeks for fruit produced in moist districts.

If the fruit is to be held after August, oil wraps are necessary to prevent scald.

I would like to thank Mr. H. V. Smith, General Manager of the Batlow Packing House Co-op. Ltd., and Mr. H. Patchell, Chief Engineer of the Batlow Cool Stores, for their hearty co-operation in this work.

## The Cold Storage of Apples and Pears.

## With Special Reference to Late Storage of Apples.

E. C. WHITTAKER, Fruit Instructor.

In spite of all the knowledge gained and disseminated during the past few years regarding cool storage condition, it is still apparent that there is much room for improvement, especially in so far as the condition of late-keeping varieties of apples ex-cool store, is concerned. It appears perfectly obvious that if the October-December market is to be used to the best advantage, then something more than the rather haphazar imethods of cool-storing fruit which have been followed in the past, is called for.

During this particular period of the year, high prices are the rule, and if the consumer is expected to pay—and keep paying—these high price then he is entitled to an article which is in the pink of condition and not—as so often happens—definitely on the down grade as regards dessert

quality

As things stand at present, the condition of much of the cool stored fruit arriving on the Sydney market during this period leaves a good deal to be desired. Various disorders such as scald. lenticel spot, ripe rot, stem-end rot, internal breakdown, etc., are altogether too common, and to make matters worse, very often these defects do not show up until several days after removal from cool store; that is, until such time as the fruit is in the liands of the retailer or consumet.

#### Congestion at Peak Harvesting.

Much of the trouble can be attributed to the congestion in the average cool store during the peak harvesting period of March and early April. Practically all the midseason varieties of apples, and most of the pears are picked during this period, and placed immediately into cool storage During the latter part of April and early May, the late keeping varieties of apples, such as Granny Smith, Democrat and Yates, etc., are harvested, and in many instances there is not sufficient refrigerated space available to accommodate them until the removal of the pears and midseasor apples. This often results in the late varieties being held in common storage for periods varying from a few weeks to sometimes a month or two. Although varieties such as Granny Smith and Democrat will stand a short period of common storage without being affected unduly as regards their cool store life, nevertheless, if this common storage period is extended to more than one or two weeks, in most cases the ultimate cool storage life of the fruit may be seriously curtailed.

The extent to which this occurs may be judged from the results obtained with Delicious apples in a series of trials conducted at the Summerland Experimental Station in British Columbia, which indicated that the particular variety will ripen less, in two months at a temperature of 32 deg Fahr, than it would in one week at a temperature of 60 deg Fahr. This, of course, would not hold good for every variety, but it is an indication of what does happen during common storage.

There is also another very obvious disadvantage to storing the late varieties as space becomes vacant, by removing midseason fruit. In this way it is often a matter of many weeks before the chamber ultimately becomes filled with the late keeping sorts, and thus there is a wide variation in condition or maturity of the fruit, and a grave danger of having "advanced fruit" stored with fruit which has been placed in store at the optimum stage, with the resultant tendency to lessen the cool storage life of the fruit as a whole

are to be held in good condition for this late market—and it must be stressed here that "good condition" does not only mean that the fruit must appear satisfactory on removal from cool store, but it must be in such condition that it is still sound and wholesome when it reaches the consumer, often a matter of several days, or even a week or so—then more attention needs to be paid to the class of fruit stored as well as the storage conditions themselves To that end it is suggested that for apples which it is intended to market during the latter part of the year, the following points should be given consideration:—

r. Prompt storage, in selected cold storage chamber, of fruit selected from certain districts (oil wraps and short period in common storage

for Granny Smith)

2. Size should have commercial value and be

suitable for long storage.

3. Fruit should be harvested from mature trees carrying average to heavy crops, at correct degree of maturity for long storage

4. As far as possible fruit should be selected from trees growing on the lighter classes of soil

The advantage of prompt storage should be obvious. This long storage, high-priced fruit should not be allowed to risk deterioration for the sake of the relatively less important midseason varieties. The period of common storage for Granny Smith should be limited to two weeks at the most, and, owing to their susceptibility to "scald" the use of oiled wraps is essential. If, as appears likely, sufficient oiled wraps are unobtainable the use of oiled strips or other substitutes would need to be considered.

From a long storage point of view, all cool stores in the State are by no means on an equal footing. The suitability of any store for this class of work depends to some extent on the class of construction and system of refrigeration used, but to a far greater extent on the efficiency or otherwise of the management—hence stores for long period work would need to be selected according to past experience of the output. Grading, packing, stacking the cases in store, etc., would also need a good deal of supervision, for the utmost care in handling the fruit through every phase of its preparation is an absolute necessity if considerable avoidable loss is not to be incurred owing to stem punctures, bruising, etc.

There is no point in storing very small or over-large sizes, which are not likely to return a good margin of profit nor are likely to hold up well, and it is absolutely vital that fruit for long period storage be picked at the correct degree of maturity—neither too green nor too mature, some experience is necessary to correctly gauge this point. Furthermore, fruit from young trees or from mature trees carrying only light crops is not suitable for this class of storage.

Experience and departmental trials have shown that fruit from the lighter classes of soil has a longer cold storage life than that harvested from

tiees on heavy soils.

Considering these requirements as a whole, therefore, it becomes obvious that if they are to be complied with, it means that fruit for long period cool storage must be selected before and not after, going into cool store. However, the job of selecting and deeding what is, and what is not suitable for the purpose, is one calling not only for a good knowledge of the characteristics of the various varieties, but also a more or less intimate knowledge of the various fruit growing districts.

To rely on each individual grower for a verdict regarding the suitability or otherwise of his particular lines for long storage would be unsatisfactory, for a variety of reasons. I ikewise, the responsibility should not be placed on the shoulders of cool store engineers, as theirs is already a full-time job during the season—and rarely is an engineer, to any great extent, conversant with actual growing conditions in his area.

In some cases the cool store management—from previous experience of the different lines—could make a satisfactory job of discriminating between fruit suitable for long, medium or short storage, but with most stores it would seem that a greater degree of satisfaction would be obtained by the appointment of a special man detailed off to inspect and decide as to the storage capabilities of any suitable lines for that purpose.

During the storage period-as a further safeguard and an indication as to how the long-storage fruit is holding—it is suggested that, beginning, say on 1st October or thereabouts, representative samples of fruit be taken from each chamber to determine the after storage life of the fruit. This could be continued at about fortinghtly intervals, and would give a good indication as to which lines were holding their condition satisfactorily and which should be shifted out promptly. It would be vitally important that such examinations be made by someone who is thoroughly conversant with fruit storage and the problems thereof.

If the foregoing stipulations are complied with, and the cool storage chambers, are efficiently managed, having due regard to the proper regulation of temperatures, humidity and control of any excess CO<sub>2</sub> accumulating in the rooms, there is no reason why certain of our apple varieties cannot be held in excellent order as late as December, and the present "hit or miss" style of storing fruit would ultimately be eliminated with considerable benefit to the industry as a whole.

## Orchard Surface Drains.

A. C. ARNOT, Fruit Inspector.

THE long dry spell and absence of heavy rains for some considerable time, has resulted in many orchardists becoming careless about surface drains. Heavy and even flood, rains will occur again sooner or later, and disastrous losses of surface soil will occur on hillside orchards if surface drains are not properly constructed, especially if advantage has been taken of the drought to work the soil thoroughly with the object of eradicating couch grass.

Far too often, no surface drains have been made, or else they consist merely of plow furrows run across the slope and not cleaned out with a shovel. These furrows will check the drift of soil downhill in a comparatively light rain shower, but are often worse than useless if the fall is heavy, as they are often too steep and scour out badly, or else too level in places, with the result that they overflow, thus collecting a lot of water at one place and causing a very severe wash.

Surface drains should be constructed carefully by running them at the proper grade - just sufficient to run off the water without any risk of overflowing and yet not so steep as to scour. A hill-side plow set to throw the soil down hill should be used, and the drains then cleaned out with a well-worn, round-nosed, long-handled shovel, throwing the soil up hill around the bottom side of the trees, and at the same time smoothing down the sides of the drain so that they will not

break down when it rains heavily, and so that the water will find its way into them easily.

In Inllside orchards, even on a gentle slope, the soil tends to drift away from the bottom side of the trees on to the top side of the trees below, and if the drains are run as far as is possible in the deeper soil near the top sides of the trees below the drain, and the soil thrown up hill when cleaning them out, it will help to cover the roots which are usually too near the surface on the bottom sides of the trees above the drain.

This throwing of the soil up hill from the topside of one tree to the bottom side of the tree above it is well worth doing in any case, especially where the grower does not use a hillside plough to keep it worked up hill, or if he cannot resoil the bottom sides of his trees regularly. Even if it does not rain heavily and there is no great need for the drains before the time comes to destroy them again by cultivation, the grower will feel he has not wasted his time. At any rate, the drains are an insurance against heavy loss of soil, which he cannot afford to neglect.

Apart from saving soil, surface drains are necessary in a very wet time such as occurs occasionally, to remove the surplus water which, even on hillsides, may lay around and rot the fibrous roots of the trees, and do more permanent damage to the trees than several droughts.

## RAILWAY TRUCKS MUST NOT BE DELAYED.

A total War Effort depends very largely upon a total Transportation Effort.

So far as the N.S.W. Department of Railways is concerned, the policy of the Administration is that the full resources of its great service shall be available to protect the security of Australia.

But, to ensure this, there must be complete co-operation by the patrons of the system, particularly by those who use railway vehicles for the conveyance of merchandise or livestock.

Any delay in loading or unloading wagons impedes the railways' effort, and, for that reason, is dangerous and inexcusable.

So—LOAD AND UNLOAD TRUCKS PROMPTLY.

S. R. NICHOLAS, Acting Secretary for Railways.



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DEPARTMENT OF AGRICULTURE.

## STUD POULTRY

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## ORPINGTONS, LEGHORNS, LANGSHANS.

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## Preparations for Wintering.

FINAL preparations for the wintering of the colonies should be made during this month. At the present time, particularly in places where the rainfall did not come early enough to stimulate the autumn flowering flora, many field-bees reared under adverse conditions will be found in the hives. The bee-farmer cannot expect that, in such circumstances, these bees will live through the coming winter and retain sufficient vitality to enable them to prove useful in building-up a brood-nest during early spring. It is obvious, therefore, that a sufficient force of vigorous young bees must be raised for the replacement of the old ones before the really cold weather forces the colony into a winter cluster.

In localities where sufficient supplies of nectar and pollen are available in the fields the bees can be depended upon to establish a satisfactory amount of brood during April. In districts where there is no late flow, however, the colonies will need to be encouraged in brood-rearing by the application of stimulative feeding with sugar syrup or honey secured from a reliable source. In the case of a shortage of natural pollen, and where the bees are not in good heart for winter, the apiary should be moved to a more favourable locality.

In all cases, with the possible exception of selected tea tree or heath country on the

coast, it is essential that the colonies be well provided with winter stores. The bees may be maintained until the end of April, or early in May in the warmer parts, by stimulative feeding as previously mentioned, but after that it will be necessary to feed heavier supplies to needy hives to enable them to build up winter stores. The hives should be made comfortable for the colonies by removing any supers not actually required by the bees or for the accommodation of winter stores. This also ensures that the stores are in a position handy to the winter cluster.

## American Foul Brood Disease.

APIARY Inspectors report that there is an increase this season in the number of hives infected with American foul brood (Bacillus larvae). This is in keeping with

past experience, which shows that some additional development occurs during a dry adverse season. No doubt the explanation is that, during unfavourable seasons, the bees

use all their available stores, and any spores of the organism, which may have been lying dormant in the stores for a year or two, will be fed to bee-larvae, infecting them with the disease. The spores remain inactive until they are fed to the larvae.

A few bee-farmers became very alarmed when they found that, after their apiaries had been free apparently of American foul brood disease for several years, one or two cases developed this season. In these in-

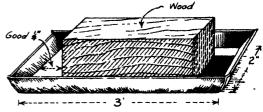
stances it is evident that a patch or two containing spores had been hidden away, and the stores containing them had not been drawn upon until this adverse season came around. It is quite likely that if precautionary measures are adopted with infected hives this season the trouble is likely to be cleared up permanently. It is extremely important to exercise every care in the manipulation and interchange of combs for a few years following an outbreak of foul brood.

## An Ant-proof Hive Stand.

DURING a recent visit to the Boorowa district, the writer was interested in several devices used by Mr. R. Pryor in his apiary and honey-room. Where ants are trouble-some Mr. Pryor employs an ant-proof hive stand which is both simple in construction and inexpensive as regards material required. It consists of a shallow tin tray nailed to a small block of wood. The accompanying illustration gives a good idea of its construction. The size of the tray need not be more than 3 inches x 2 inches and the space around the block of wood should be at least 14-inch wide.

The container-space around the block is filled with old motor grease or similar substance. The ant-proof stand is then turned upside down, in which position the ants find it very difficult to get over the grease, which they have to do, to reach the hive. Four stands are required, one being placed under each corner of the bottom board, giving maximum support to the hive and at the same time keeping the grease-filled containers in the shade.

If desired, this device may be employed as an ordinary type ant-proof stand by placing it under the hive with the wooden block uppermost, and then filling the container with coal-tar mixed with a little kerosene, but when filled with grease and used in the reversed position, the ants have

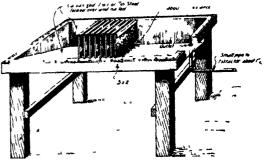


For Ant-proofing Hives.

greater difficulty in securing a grip and crossing over; they certainly cannot leap the barrier. This type of stand has proved useful in the home and honey-house when ants have been troublesome, and one application of grease is effective for a lengthy period.

## A Handy Device.

In his honey house Mr. Pryor has installed a large-sized semi-radial extractor driven by a small water cooled motor, together with a steam-heated cappings-reducer, steam uncapping knife, small semi-medium pressure steam boiler, honey tanks, and a home-constructed device for holding uncapped combs. An illustration of the uncapped-comb holder is shown on this page and many bee farmers, including those working in a small way, would benefit by having one installed in the honey room.



Useful Table for Holding Uncapped Combs.

As uncapped combs are fairly heavy it is necessary to make the table-like holder out of strong timber, well braced. The drip tray should be of heavy-gauge tinned steel or galvanised iron, the angle-shaped dip being deep enough to provide a one-inch space under the lower corner of the bottom bar of the frame of uncapped comb. The honey that drips from the combs is drained

from the tray by means of a pipe which leads into the extractor. The loney could be easily drained into a bucket if it is not desired to connect with the extractor. Some bee farmers have drip trays in which the frames of uncapped combs fit right inside, the lugs being supported as in a hive, but this requires much more tinned steel or galvanised iron, and serves no useful purpose.

## Extracting Outdoors Undesirable.

A FEW bee farmers still continue to extract honey in the open at out-apiaries, and complaints have been received from neighbouring bee farmers regarding this practice. It provides conditions which encourage robbing raids and tends to excite colony temperament, thus adding to the difficulty of manipulating the hives. Apart from other undesirable features, open-air extracting work cannot on all occasions be carried out under conditions as hygienic as in a well-constructed honey house. Most commercial

bee farmers have an up-to-date central honey house and equipment, but where this is not available a small properly covered portable outfit may be established. Even a good marquee is a handy and serviceable substitute.

Apiary Inspectors have been appointed as officers under the Pure Food Act and they have been instructed to investigate the conditions under which honey is extracted in the open.

## Acarine, or "Isle of Wight," Disease.

## A Possible New Cure.

Acarine disease, sometimes still known as "Isle of Wight" disease, is caused by the invasion of the thoracic tracheæ of the adult honeybee by the mite Acarapis woodi. Although no longer epidemic, this complaint still causes the complete destruction of many colonies of bees annually in England and the serious weakening of many others.

To kill the mites inside the tracheæ of an infected bee, some volatile substance which exerts a marked differential toxicity upon the bee and A. woodi would appear necessary. Up to the present a small number of substances or mixtures has been found to have properties tending towards the desired objective. These have not, however, been found to be entirely satisfactory. Work has therefore been carried out here during the last two and a half years in an attempt to find a volatile material which kills

.1. woodi in the tracheæ of the honeybee, does not harm the adult bees or their brood. and is simple and cheap to apply, writes C. G. Butler, of the Bee Department, Rothamsted Experimental Station, Harpenden (Eng.), in Nature. Many substances were tested with varying degrees of success, and it has been found that the vapour of terpineol, a heavy faction of crude pine oil, gives the results desired, being highly toxic to A. woodi, but harmless to bees. In one experiment twenty-five bees which were heavily infected were subjected to the vapour of terpineol for five days, and at the end of this period all the mites were found to be dead, whereas twenty control bees were all found to contain many live mites.

Experiments are now being conducted to determine a simple and satisfactory method of administering terpineol to a colony of hees.

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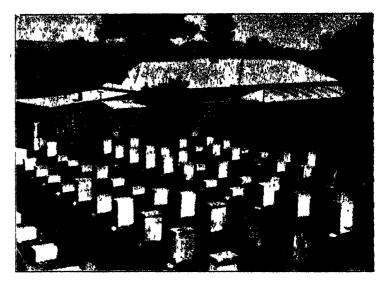
## TWO BOOKS

for

## BEEKEEPERS.

"Bees and Honey."

"Honey and Pollen Flora."



"BEES AND HONEY," by W. A. Goodacre (Senior Apiary Instructor), is proving a ready seller. This recently published booklet is a storehouse of information, meeting the requirements of both the novice beekeeper and the commercial apiarist.

Many settlers on small areas in fair localities for beckeeping could improve their incomes by working small apiaries as a sideline, writes Mr. Goodacre. A start should be made by the purchasing of good hives and then following out modern methods of management. An effort should be made, too, to Italianise the colonies.

Unless the beginner knows of colonies for sale locally, it is a good plan to advertise in a bee journal, or in the local papers. It is not advisable to purchase more than two or three colonies for a start, and these should, if possible, be obtained from a practical apiarist of whom the buyer has some knowledge. Another plan for the beginner is to purchase one or two nucleus colonies from a queen-raising apiary.

#### Many Suitable Districts.

Good localities for beekeeping are not confined to a small area in New South Wales, but already a sprinkling of proved districts is quite widely spread over the State, and in the majority of these districts there is room for an additional number or practical apiarists to commence operations. Not only has the State a large area of forest country well tumbered with good varieties of flora (notably the different varieties of eucalyptus, the blossom of which is unrivalled for producing honey of excellent quality), but there are also districts where a good quality of honey is stored from such ground flora as clover, lucerne, thistles, etc. In some fairly well-populated areas, where the timber has been thinned out to provide for cultivation and grazing, the ground flora keeps the beekeeper's returns on a satisfactory basis.

Occupation permits for the purposes of apiary sites and bee ranges are granted by the Forestry Commission in relation to State Forests, subject

to certain conditions, rentals, etc. The ranges embrace areas varying from one to three square nules, and the provisions under which they are granted preclude apiaries from being placed too close to one another. The Commission is willing to consider the interests of any apiarist adjoining a State Forest, and it is always open to a beekeeper so situated to apply for a permit over the adjacent State Forest

The issue of permits for beekeeping on Crown lands is a matter for consideration by the Department of Lands, which Department issues special leases for the purpose

Equipped with the knowledge contained in "Bees and Honey," the beekeeper should be well on his way to success. The price of this booklet is 28, 6d, plus postage (2d.).

#### Honey and Pollen Flora.

A valuable companion to the abovementioned booklet is "Honey and Pollen Flora of New South Wales," by the same author. Price 5s., plus postage (6d.).

This latter book meets the definite need of beekeepers throughout the State for reliable information on the honey and pollen value of our flora. Not only will it enable apiarists to identify the species that are useful to them and give information as to the quality of the honey and pollen produced, but it discusses also such phases of the flora as the indications of approaching budding and new growth, flowering periods, etc.

The book is divided into two main sections—coastal and inland flora—and in each section detailed descriptions of the appearance and value of the species are followed by accounts of the flora of various localities within those areas.

Excellent illustrations are a special feature of the book. Line and process blocks giving details of the buds, flowers, fruit and leaves support the descriptions in most cases, and twelve coloured plates add considerably to the attractiveness of the work.

## To Destroy Wild Tobacco.

## Avoid Over-grazing of Pasture.

EXPERIMENTS recently concluded have very forcibly demonstrated that the incidence of wild tobacco (Nicotiana glauca), like many other weeds, is largely influenced by the management and condition of the pasture cover. Overgrazed pastures give ideal conditions for weeds to germinate and thrive while good pastures, by the competition afforded, automatically exclude many weeds.

Trials, aiming at the eradication of wild tobacco, were commenced in the autumn of 1936 on rough mountainous grazing land where the pasture cover was extremely poor due to the depredations of rabbits. Various poisons and methods of application were tried and observations on all these treatments showed that spraying wild tobacco was unsatisfactory, and that the best results were obtained by applying dry sodium chlorate to the exposed surface of plants cut off near the ground

level, or by swabbing with 20 per cent. arsenic pentoxide solution.

While it was possible to kill all original plants by poisoning it soon became obvious that poison treatment was not the solution for wild tobacco, as in the seasons following poisoning a greater population of the plant occurred than the original infestation, due to seedling growth. Working on the assumption that the infestation was due to the poor natural competition afforded by the denuded pasture an area was enclosed in rabbit-proof fencing in May, 1938, and all rabbits removed. This was laid out in three plots that were poisoned and top-dressed, poisoned only and top-dressed only. This area has not been stocked or received further treatment, but the wild tobacco has practically disappeared from the whole of the enclosure, while in contrast the infestation is very dense immediately outside the rabbit-proof fence. Within the fenced area that is now free of tobacco, there is a dense pasture in contrast to almost bare ground where the tobacco is thriving.

# Wheat Prices on Sydney Market. 1890 to 1941.

The following table, showing the average price of wheat for February and March of each year and also the average yearly price since 1800, was compiled from figures obtained from the Government Statistician and the Division of Marketing —

<b>\ e</b> ar	February March	Average price for year	Year lebruary	Much	Average price for year	Year	] ebruary	March Average price for year.
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Don't Let Rumours or Secrets Get any Further than You.

# FOLIAGE POISON SPRAY For Queensland Fruit Fly.

## Tot Queenotatic Trust Trys

5 I ALIMAN, B Sc Agr., M Sc., Senior Entomologist

Tartar Emetic and Sodium Fluosilicate Compared.

TESTS carried out during the past two seasons with foliage poison sprays for the control of Queensland fruit fly have shown that: (1) tartar emetic is more effective than sodium fluosilicate, since it is not repellent and causes less injury to foliage; and (2) white sugar is better than molasses as a medium, since molasses is actually distasteful to the fly and also causes considerable foliage burn.

I oxicity tests were carried out in three series. In the first flies were compelled to teed on the bait in the second an alternative food supply consisting of sugar and with with the softmously available and in the third the foliage poison sprity was applied direct to foliage in a larger case to approximate natural conditions, an alternative food supply being available.

These toxicity tests only indicate the total effect of poisoning and any repellent influence the latter being shown by a longer period elapsing before poisoning of the flies. Under field conditions repellence would be of great importance as the spriv is not applied to the whole tree.

S drive fluosificate and tartar emetic were compared by the three methods outlined. The results of these tests as set out in Fig. 2 demonstrate

that taital emetic was markedly superior to sodium fluosilicate under the conditions of all three tests. Lutthermore little loss in efficiency was apparent with taitar emetic sprays where flies were allowed a choice of food whereas an alternative supply of su aircsulted in a definite decrease with so lium fluo silicate sprays.

The basis for comparisen of the verous sprays was the time taken to kill 50 per cent of the flies used in the test

Latter emetic revealed superiority over both forms of sodium fluosilicate judged on the basis of time to kill 50 per cent f the flies, it had more than double the emeiory of the fluosilicates

I wo brands of 5 dium fluosilicate commonly used by New South Wales fruitgrowers were included in the tests of foliage spray applied to fruit foliage. These two

brands differed noticeably in their physical properties. The results of these tests are set out in the following table.—

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\*ligur 5 in black type represent first is order a mortality of

## Concentrations of Sodium Fluosilicate.

In vi w of the evilence of some repellence by sodium fluosilicate sprays, tests were carried out with sodium fluosilicate at weaker concentrations

The results obtained indicated that sodium fluosilicate at the rate of 1 oz to 4 gallons (the amount used in South Africa and also in Wostern Australia for the control of Mediterranean I ruit 1 ly) killed files just as rapidly as did the spray containing the normal dose of 2 oz of poison to 4 gallons. The amount of spray consumed was obviously greater in the case of the weaker dosages.

## Effect of Temperature.

During the course of these experiments in the various concentrations of sodium fluosilicate it became apparent that temperature exerts a

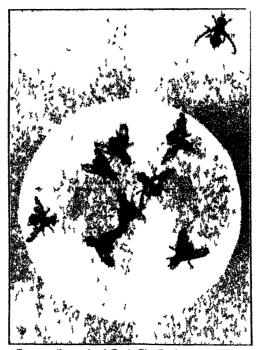


Fig 1—Queensland Fruit Fly Feeding on Foliage Poison Spray in Cage Test [Slightly snlarged

great influence on the performance of the various sprays. Tests carried out in December, when the normal mean temperature was approximately 70 deg. Fahr., gave a 50 per-cent. mortality in approximately three and a half days; whereas similar tests in March, when a cold spell was experienced, failed to give a 40 per cent. mortality at the end of seven days. This aspect of the problem may assume some importance in the control of flies during the autuum when citrus fruits may be "stung"

In all tests carried out approximately equal numbers of males and females were included. Separation of the figures for the two sexes indicated that the female flies were consistently slightly more resistant than the males.

#### Foliage Tolerance Tests.

During the past season several instances of defoliation of peaches following the use of sodium fluosilicate-sugar baits were recorded. Tests were

definitely better than that receiving the sodium fluosilicate sprays.

The use of molasses with tartar emetic caused a considerable amount of tip burn and some slight bark injury. Sugar alone did not produce any noticeable injury, whereas molasses alone caused a considerable amount of tip-burn to the leaves. In all instances where sugar or molasses was applied to the foliage a sooty mould fungus developed, being particularly abundant in the case of the molasses mixtures.

#### Summary.

- (1) Tartar emetic has proved more effective in killing Queensland fruit flies than sodium fluosilicate. Tartar emetic did not give any evidence of repellence and caused little mjury to peach foliage.
- (2) Sodium fluosilicate, at the regulation dosage of 2 oz to 4 gallons of water appeared to be

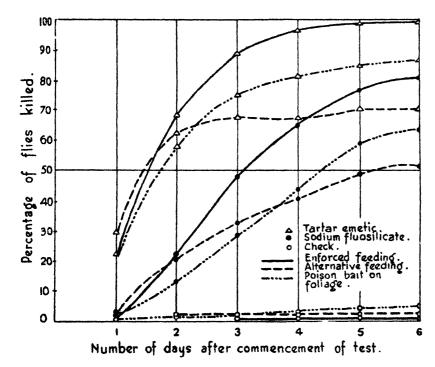


Fig 2.
Relative Effectiveness
of Tartar Emetic and
Sodium Fluosilicate.

therefore carried out on peach trees to which weekly applications were made of sodium fluosilicate and tartar emetic.

Sodium fluosilicate caused some slight degree of foliage injury and a roughening of the bark on the young laterals. The injury to the leaves consisted of a small amount of tip-burn and the burning of small circular patches, giving the leaf a characteristic shot-hole effect.

Tartar emetic, with sugar, gave only a very limited amount of tip-burn, and no burning of the bark. The appearance of the sprayed foliage was

slightly repellent. A foliage poison spray containing I oz. of sodium fluosilicate to 4 gallons of water proved equally as effective as the 2 oz. mixture.

- (3) Two brands of sodium fluosilicate in common use differed little in efficiency, and both types caused more foliage injury than a tartar emetic mixture.
- (4) Male and female flies differed but slightly in their susceptibility to foliage poison sprays.
- (5) Foliage poison sprays appeared to be less effective during cold spells than under normal summer conditions.

# INSECT PESTS.

Notes contributed by the Entomological branch.







## Mealy-bugs.

(Pseudococunae.)

THE mealy-bugs constitute a group of members of the family Coccidae, or scale insects, and the females, in common with all the species included in this family, are wingless. They are covered with a white, mealy wax, and from this they have derived their popular name. The native species do not appear to be of great economic importance, but a number of introduced species, of which the long-tailed mealy-bug is probably the most common, are amongst the most serious plant pests.

Heavy infestations may occur on various trees, shrubs, and cultivated ornamental plants, amongst which may be mentioned citrus, guava, red and black currants, orchids, ferns, various bulbs, gladiolus corms both in the field and store, leaves and roots of various grasses and clovers.

Mealy-bugs prefer moderate to warm climates with moist conditions, so that the temperature and humidity which usually prevail in glass-houses and ferneries or where plants are grown indoors, are very favourable for their development and they increase very quickly. The sheath about the base of a leaf, the under surfaces of leaves and the lower parts of fern fronds, are favoured feeding places, and infestations at these sites often pass unnoticed until the bugs have increased to enormous numbers.

They feed by piercing the plant tissues and sucking up the sap, and may be found on all parts of plants, both above and below ground. Mealy-bugs excrete "honeydew," which adheres to and disfigures the foliage upon which it falls; and a black sooty mould which develops in the "honeydew" adds further to the disfigurement. Ants are attracted by the "honeydew" and feed upon it, and to

some extent prevent the mealy-bugs being attacked by natural enemies, such as lady-bird beetles and their larvae, parasitic wasps and flies. In addition, where ants are present, they may assist in spreading root-feeding mealy-bugs, as they construct galleries along or amongst the roots of the plants so that the mealy-bugs have ready access to fresh roots.

#### Description and Life-history.

The females, which measure up to about one-fifth of an inch in length, are flattened, clongate-oval in outline, and their bodies are covered with wax-glands. These glands secrete the white, waxy or mealy covering and the characteristic fringe of white filaments around the margins of the insects. Their bodies, beneath the mealy covering, vary in colour, and depending on the particular species, may be pale yellow, pink or

purple-grey. They possess well-developed legs and antennae and crawl freely, but slowly, when disturbed or seeking a fresh feeding site. The foot is one-segmented and bears a single claw.

Most species, when mature, produce a mass of white, waxy, filamentous material from glands at the tip of the abdomen. This ovisac or egg-covering may eventually become as long as, or even longer than, the body of the insect itself. At this stage they are very conspicuous objects on their host plants.

The minute eggs, which are elongate-oval in outline, are laid beneath this cottony mass. They vary in colour and may be pale yellow, reddish or purplish. Some species

produce living young.

The males, in their first or "crawler" stage, resemble the females, but later form thin, cottony cocoons, about one-eighth of an inch in length, within which they develop. The adult males are minute, delicate, two-winged insects, and in this stage have aborted mouth parts and do not feed. Their legs and antennae are well-developed and they are able to fly.

#### Control.

Ladybird beetles, parasitic wasps and flies, normally play an important part in assisting in mealy-bug control. The larvae of some of the species of ladybird beetles belonging to the genera Scymnus and Cryptolaemus may be mistaken for large mealy-bugs, being entirely covered with white meal and long white filaments, thus closely resembling the mealy-bugs upon which they feed. The Cryptolaemus ladybird and its larvae are commonly found feeding upon the golden mealy-bug which infests various species of pine trees.

Mealy-bugs, when mature, are not readily controlled with ordinary sprays, as their protective waxy covering renders it difficult to wet them, and control becomes more difficult where they are found to be infesting plants which have delicate foliage.

#### Fumigation.

Fumigation of glasshouses with low dosages of hydrocyanic acid gas is sometimes practised to control mealy-bugs, but care has to be taken to ensure that the correct conditions of temperature and humidity prevail. Where fumigation with hydrocyanic acid gas is undertaken, the work

should be carried out by an experienced operator, as this gas is one of the most poisonous gases known. Ventilators should be arranged, especially those on the roof, so as to permit of opening from the outside after fumigation. In addition, no person should attempt to fumigate a large glasshouse alone.

Calcium cyanide has been used successfully to control mealy-bugs infesting staked grape vines. The funigation was carried out during the dormant period, and specially constructed covers were placed over the vines. The calcium cyanide was used at the rate of 1 oz. to 100 cubic feet.

#### Treating Gladiolus Corms.

Where stored gladiolus corms are infested, the mealy-bugs may be controlled either by immersion in a warm nicotine sulphate and soap solution, or by funigation with calcium cyanide. To carry out the former method, the corms are suspended in the solution within an open-meshed bag. The solution is prepared at the rate of nicotine sulphate I fluid oz, soap 2 oz., water 4 gallons, and is maintained at a temperature of 100 deg. Fahr for two hours. Some form of stirrer, to keep the solution moving, and a thermometer are essential. Once the water has been heated to the required temperature only a very small flame is necessary to maintain it at that. The corms should be drained after treatment.

Fumigation with calcium cyanide at the rate of 1 oz. to 100 cubic feet for 1 hour will control the mealy-bugs. A small airtight chamber may be used for this purpose; it should be situated outdoors, and care must be taken not to inhale the poisonous gas

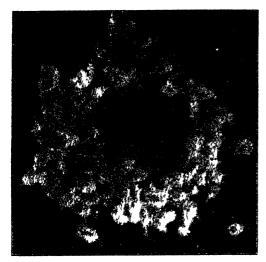
With either of the above two methods the corms should be treated while dormant. If growth has re-commenced, injury, such as retarded leaf-development or lack of blooms, may occur.

### Sprays May Injure Delicate Plants.

When sprays are used, care should be taken to prevent the spray collecting around the base of delicate plants or in leaf-sheaths, as the roots or other portions may be seriously injured. This may be avoided where the plants are in pots or baskets by placing them on their sides. Sprays containing oil are liable to injure delicate fern foliage, and

nicotine sulphate and soap solution, at normal strength, has been found seriously to injure maiden hair ferns.

On hardy plants and trees, young mealybugs may be controlled by spraying with a



Group of Mealy-bugs Congregated Where Two Fruits Have Been in Contact.

[After Clausen

nicotine sulphate and oil solution, the proportions being: nicotine sulphate 1 fluid oz., white oil emulsion 12 fluid oz., casein spreader t oz., water 4 gallons. If it is considered that the plants may be susceptible to spray injury, the quantity of white oil emulsion should be reduced to 8 fluid oz

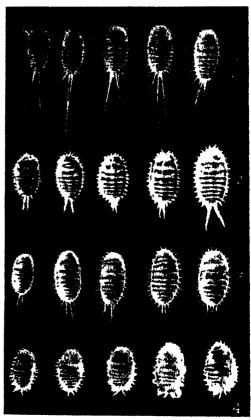
A solution of derris and soap at the rate of derris powder 2 oz, soap 2 oz., water 4 gallons may also be used. This mixture should be freshly prepared.

A resur-soda spray, prepared according to the department of formula (Spray Leaflet No. 7) may be used against mealy-bugs on citrus trees and hardy shrubs.

## Treating Root-feeding Mealy-bugs.

Control of the root-feeding mealy-bugs is very difficult, as many plant roots are susceptible to injury by soil fumigants and various solutions. Measures such as opening up the soil around the plants and then working in derris dust, pyrethrum, tobacco dust, etc., around the roots have been recommended. The soil is then replaced and watered to carry the extracts into the earth around the roots. These measures, however, are only of limited value.

If ants are present, control of these may be of use in delaying the spread of the mealy-bugs, more especially of the underground forms. Various ant baits are given in Spray Leaflet No. 46. (Spray Leaflets Nos. 7 and 46 are available on application to the Under-Secretary, Department of Agriculture, Sydney.)



Four Common Introduced Species of Mealy-bugs.

1. Pseudococcus adonidum (the Long tailed Mealy-bug).

2.—P gahan: 3.—P maritmus. 4.—P. cstrs.

4. After Clausen

## Sweet Potato Weevil.

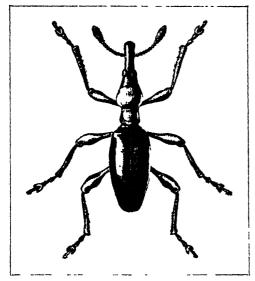
(Cylas formicarius.)

This insect is a world-wide species occurring wherever sweet potatoes are grown, and at times it is a pest on the North Coast of New South Wales.

The main damage is caused by the grubs of the weevil feeding in the tubers, both in the field and during storage. The adults

feed to a lesser extent on the tubers, but may also feed upon the stems and leaves of the plants.

The adult weevil, which is ant-like in general appearance, is about a quarter of an inch in length and of a general dark, metallic-blue colour, the portion of the body just behind the head being bright red. The minute eggs are laid in the stems or tubers of the plant, and from these hatch white, legless grubs which are about three-eighths of an inch in length when fully-fed.



The Sweet-potato Weevil.

These grubs tunnel through the stems and tubers, the latter being reduced to a decaying mass. The grubs pass into the pupal or chrysalis stage in an oval chamber within the tuber. Later the adult weevils emerge, and commence to lay eggs, thus completing

the life-cycle. In warm weather the life-cycle from egg to adult may only occupy thirty days. The weevils continue to breed during the winter months, but the cold weather greatly reduces their activities.

#### Control Measures.

Although the weevil is winged, its powers of flight are limited, and the spread of the pest is largely caused by transportation of infested tubers or plants. Growers should, therefore, obtain tubers for propagating purposes from localities known to be free from the weevil.

The pest over-winters mainly in tubers or stems which have been left in the ground after harvesting or in "volunteer" plants, and therefore, clean cultivation between crops, burning or boiling of all infested tubers and dead vines, careful harvesting so that no tubers remain in the soil, and a regular rotation of crops are the chief control measures.

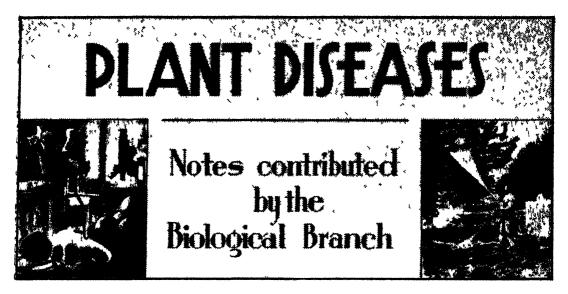
Weevils are often carried over the winter in the seed-bed, which should, therefore, be located as far as possible from where the main crop is to be planted, and the tubers used should be destroyed as soon as the young vines are obtained.

Where sweet potatoes are grown year after year on the same ground the infestation by weevils becomes increasingly severe each year. Infested tubers which are not completely destroyed may be utilised as pig feed after they have been boiled.

Where the adult weevils are feeding on the leaves or stems, spraying with arsenate of lead mixed at the rate of 1 lb. of arsenate of lead powder to 40 gallons of water, and dipping the tops of the young plants in the arsenate of lead solution when planting out, are recommended.

## **GUARD YOUR TONGUE.**

You may pass on a minor piece of information that is harmless in itself, but linked with other pieces it forms a dangerous chain of rumour.



# Seed Treatment for Cabbages and Cauliflowers For Control of Black Rot and Black Leg.

SINCL some late sowings of cabbages may still be made in metropolitan districts, attention is again drawn to the hot water treatment of seeds for control of black rot and

black leg Both diseases may be carried by the seed, and may also live over in the soil in fragments of diseased stems and leaves. Land which has borne an infected crop should, therefore, not be used again for crucifers for at least two years.

If the seed is known to come from a clean crop no treatment is necessary, but if there is reason to suspect that it may have come from plants which were diseased the hot water treatment should be given. This kills the parasites while leaving the seed unharmed.

Seed of high germination capacity should

be used, if seed of low vitality is treated, appreciable injury may result

### The Hot Water Method.

About 3 or 4 gallons of water should be heated to 122 deg Fahr (50 deg () and maintained at this temperature The seed is then loosely tied in cheesecloth bags and suspended in water. After treatment the seed should spread out on paper to dry in a warm, shady place. There is danger of the seed becoming mouldy if drying is not complete.

A suitable vessel for seed treatment is a kerosene tin provided with a wooden lid with holes for thermometer and stirrer. The stirrer can be a stick with a perforated piece of tin at ached to the lower

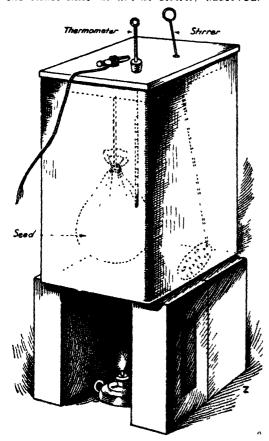


Portion of Cabbage Leaf Affected With Black Rot [After Smith

Page 192

end. If this is moved up and down at intervals, it gives a good circulation of water and an even distribution of heat.

The bags of seed should be suspended in the water by a piece of string, and each bag should contain not more than about 1 lb. of seed. The small flame needed to maintain the temperature of the water at 122 deg. Fahr, is most conveniently secured by using a small kerosene lamp, of which the flame can be adjusted as needed. The thermometer should have a plain glass stem so that it can be put easily through the hole in the wooden lid into the water. The operation should be carried out in a shed rather than out in the open, as draughts and air currents make it difficult to maintain the required temperature. It is most important to keep the temperature constant during the treatment and the exact time should be strictly observed.



Apparatus for Hot Water Treatment of Seed,

Cauliflower seed is treated for 18 minutes and cabbage and turnip seed for 25 minutes at 122 deg. Fahr.

New soil, or soil which has not previously been used for crucifers, should be used for the seed-bed, and every care should be taken to avoid possible sources of contamination.

# Late or "Irish" Blight Disease of Potatoes and Tomatoes.

LATE or "Irish" blight, caused by the fungus Phytophthora infestans, frequently causes very serious losses in potato and tomato crops. In most of the tableland districts the disease usually reaches epidemic form only once in every four or five years, but on most sections of the coast, as well as on the more easterly fringe of the highlands, the disease may occur every year. One of the most important aspects of the disease is the rapidity with which it may spread under conditions favourable to its development, e.g., periods of moist weather with cool nights and relatively warm humid days. A spell of warm, dry weather will often check its progress.

#### Potatoes.

All parts of the potato plant may be affected, and the disease may also develop on the tubers in storage. The most characteristic symptoms appear on the leaves in the form of dark, water-soaked areas. These discolourations usually commence at the margins of the leaf, and enlarge rapidly until the whole of the leaf is affected. The leaves may blacken and shrivel, or if the weather conditions are still moist, may rot away.

In the early stages of development of the disease, a close examination of the affected leaf will reveal the presence of delicate, downy outgrowths of the causal fungus, particularly on the underside of the leaf just adjacent to the healthy tissue. Blackened, elongated discoloured areas may develop also on the leaf stalks and stems.

The disease is spread from plant to plant by means of spores which are produced by the fungus. Under favourable conditions each spore gives rise to a number of smaller spores which are able to swim actively in the moisture present on the leaves. Each of these small spores may cause a new infection within a few hours.

Tubers may become infected before digging from spores which are washed down from diseased plants into the soil, or through contact with diseased foliage at harvesting



Section of Potato Affected With Late Blight

The disease first shows up in the tuber in the form of slightly sunken spots, which are purplish black in colour. These spots may increase in size until the whole of the tuber is involved. If tubers are cut through in the early stages of the disease irregularly-shaped, reddish brown blotches will be observed in the flesh of the tuber just underneath each discoloured spot.

Sometimes the tubers remain comparatively firm and have the appearance of a "dry rot" but more frequently the symptoms are complicated by the presence of secondary bucture which result in development of a soft civil sincling rot

The disease may originate from infested tubers which are used it planting, or from such tubers which were not removed at harvesting. There is evidence also that the fungus itself may live over in the soil in a resting spore condition. A heavy frost which kills the plants will also kill the spores which are mainly responsible for the spread of the disease.

#### Tomatoes.

Tomatoes may be affected with the blight disease at practically any stage in their development. The fungus which attacks tomatoes is a distinct strain or form, although it closely resembles the form on potatoes Serious losses are sometimes encountered in the seed-bed owing to the total destruction of individual plants through "damping-off". An examination of affected plants will frequently reveal a darkened area on the main stem, at or near the ground level, somewhat similar in appearance to that described for the potato. The tissues at this spot soon become shrivelled, and the whole plant falls over and withers. Although other funging may also be responsible for this condition, the late blight fungus is one of the most important in this councetion.

The late blight fungus is also responsible for the production of darkened diseased areas on the stems of well developed plants. This stem girdled condition may cause scrious damage under glasshouse conditions as well as in field crops.

The appearance of the disease on the foliage of older tomato plants is similar to that described for potatoes. The general appearance is often such as to suggest the action of frost.



Potato Leaf Affected With Late Blight
After McAlpine.

The developing fruit may also become affected. Dark-greenish, somewhat water-soaked areas appear on the surface of the fruit, and the causal fungus may later develop on the affected tissue in the form of small, downy outgrowths. Serious damage sometimes may not be apparent until after the fruit has reached the market.

#### Control Measures.

Blight may be controlled on potato crops by spraying with 1-1-10 Bordeaux mixture.

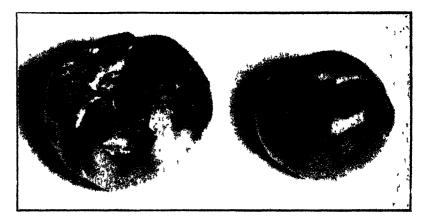
The spray should be applied when the plants are from 6 to 9 inches high, and should be repeated at fortnightly intervals if weather conditions warrant it. Application should be made at high pressure through fine nozzles, and the spray should be directed on to all portions of the plant. If a late

Sort out visibly-affected tubers before shipping or placing remainder in storage. Tubers should be kept in a dry place and at a temperature of 38 deg. Fahr. or less, to prevent development of the disease in storage. Diseased tubers should be boiled before being fed to stock.

Practice rotation of crops. Do not sow potatoes in the same area year after year. As far as practicable, remove and destroy diseased foliage and tubers.

Control measures for tomatoes follow the same general lines as recommended for potatoes. Every effort should be made to keep a coating of Bordeaux mixture on the foliage of the plants. Bordeaux of 1-1-10 strength may cause some burning, particularly in the case of glasshouse crops, for





attack has caused serious damage to the plants at the close of the growth period, it has been found that some loss may be prevented by spraying the vines and the soil with copper sulphate (1 lb. to 4 gallons). This spray kills the plants and prevents further development of the fungus.

Under general conditions, however, when the disease has developed in a crop, allow the plans to die and dry completely before digging is commenced. The tubers should be picked up as soon as they are dug, and should never be covered with the dead plants. It is sometimes suggested that hilling will protect the tubers from infection, but unless the hilling is done so as to form a ridge, the effect is rather to form a funnel which may facilitate the washing of spores on to the tubers.

which a 1-1-20 concentration is recommended. It has been found that white oil added to Bordeaux mixture in the proportion of 1 in 150, minimises spray injury to a large extent. When an insecticide, such as arsenate of lead, is combined with Bordeaux mixture, and spray applications are made once a week, the strength of Bordeaux mixture may be reduced to 1-1-40.

Glasshouse growers should use the Bordeaux spray until as late a stage as possible, and should attend to ventilation and methods of watering in order to prevent development of excessive humidity. Only clean soil, or soil which has been sterilised with formalin, should be used in the seed-bed, and the seed-lings should not be watered excessively. Overcrowding and excessive watering are the most frequent causes of trouble at this stage.

O

# Shot-hole of Stone Fruit.

Growers whose apricots were infected with shot-hole scab or whose almonds have shown scab or gum spot, should not neglect to apply the autumn spray of Bordeaux mixture (6-4-40), plus an efficient spreader.

It is not sufficiently realised that the fungus responsible for these diseases allo causes a serious bud blight, and that in this phase of the disease the damage is done in the winter mouths.

The first spray must go on when the last of the leaves are falling, and care should be taken to get a thorough cover of all parts of the tree, particularly of the young wood and buds for next season's crop.

A second spray application should be made in spring when a trace of petal colour is apparent in the blossom buds. Use an effective spreader with each spray application.



Shot-hole Disease on the Moorpark Apricot, caused by Clasterosporsum carpophilum.

# Defective Germination of Pea Seed.

## Beneficial Results from Use of Seed Dusts.

The failure of pea seed to germinate is a perennial problem, though losses may vary according to season and district. Contributory factors are warm, wet soil and poor quality seed. Cracked, discoloured seed is hable to germinate badly, but it is not always possible to judge from the appearance alone. It is true that treatment of high grade seed planted under ideal conditions will not give an increase in germination, but it is nevertheless a good insurance against possible losses to treat all seed before sowing with a fungicidal dust. The cost is not great.

Defective germination is due to the rotting of the seed in the soil, or to the death of the young plant before it emerges above the soil surface. This is caused by the attack of mould fungi, which are present on the seed and in the soil.

The method of treatment is to cover the seed with a film of dust which kills the organisms present on the seed coat, and also

gives the emerging seedling a degree of protection against possible parasites in the soil.

#### Procedure.

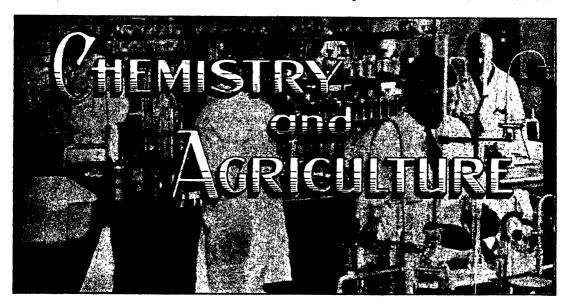
Recommended dusts are copper carbonate, copper oxychloride or cuprous oxide, or one of the mercurial compounds, Ceresan and Agrosan. Copper carbonate and cuprous oxide are used at the rate of 2 oz. per bushel and Ceresan and Agrosan at the rate of 1/2 oz. per bushel.

Small lots of seed may best be treated by shaking with the dust in a closed tin or other container for several minutes. With larger quantities a hand-operated revolving drum or barrel is satisfactory. Dusted seed cannot be inoculated with nodule bacteria, for the obvious reason that the bacteria would be killed. Wherever possible, therefore, land which has already borne a crop of peas should be used, as the nodule-forming bacteria will already be present in the soil.

# Broadcasting Hours Altered.

To comply with the new Commonwealth regulations, which prohibit broadcasting before 6.30 a.m.. the early morning "Man on the Land" session from 2SM (J. Crawcour

—announcer) will in future be on the air from 12.35 to 1.15 p.m. Mondays to Fridays, inclusive. This session has just completed seven years' continuous service.



# The Geologic Sources Of the Commoner Chemical Elements.

# Their Agricultural Significance.

(Continued from page 148.)

A. N. OLD, B.Sc.Agr., Analyst.

# MAGNESIUM.

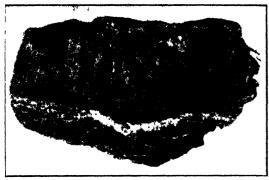
ABOUT 1.9 per cent. of the earth's crust consists of magnesium, the eighth most abundant of the elements and the sixth most abundant metallic element. Oxygen, silicon, aluminium, iron, calcium, sodium and potassium have already been discussed, and these with magnesium are the only elements present to the extent of 1 per cent. or more—collectively, they account for 97.3 per cent. The gas hydrogen occupies ninth place with 0.9 per cent., and the remaining eighty-one or more elements, including many of great practical importance, make up the other 1.8 per cent.

Magnesium is the principal member of a group of metals which includes zinc, cadmium, mercury and beryllium. In many respects it resembles calcium also, and it has sometimes been classified along with that metal as an alkaline earth. Magnesium com-

pounds were undoubtedly known to the ancients, but the individuality of the element was only gradually recognised. The oxide, magnesia, for example, was confused with lime until 1729, although Grew had discovered magnesium sulphate in the waters of Epsom in 1695 and works for extracting Epsom salts had been established near London by 1700. Humphrey Davy, who isolated many elements from their compounds by electrolysis, proved in 1808 that magnesia was a metallic oxide, but was unable to isolate the metal. Liebig and Bunsen obtained the free metal in a pure state in 1830.

# The Occurrence of Magnesium.

Although not present as the free metal in nature, magnesium compounds are widely distributed in both silicate and non-silicate minerals. In igneous rocks magnesium and iron are commonly associated in what are known as the ferro-magnesian silicates; these are usually dark coloured and increase in amount from acid to basic rocks. Thus, as a general rule, basic rocks such as basalts, gabbros, etc., are dark in colour compared with the acid types (granites, etc.). The commonest ferro-magnesian silicate minerals are biotite (black mica), hornblende, augite and olivine. Forsterite is a silicate of magnesium alone.



Vein of Asbestos in Serpentine, Barraba, N.S.W.

Secondary minerals derived by alteration processes and containing magnesium silicate are tale, serpentine, meerschaum, asbestos and chlorite. The rock serpentine consists largely of the mineral of the same name, and dunite is almost entirely olivine. Both have been used in New Zealand for the preparation of serpentine-superphosphate (formerly called silico-superphosphate). Although neither serpentine nor dunite con tains phosphate, they confer certain benefits, under New Zealand conditions, when mixed with superphosphate in a 1:3 proportion (see Agricultural Gazette, July, 1940). Serpentine is used also as a building stone and for ornamental work. Steatite, a form of tale, is used for lining furnaces and stoves; for lessening friction in machinery; for carvings, especially in India and China; and for removing grease from cloth. French chalk is a form of steatite. Asbestos is a general term for several magnesian minerals used in building materials. fire-proof fabrics, and heat and acid resisting compositions.

# Magnesium in Non-Silicate Minerals.

Very large deposits of magnesium carbonate occur, both as magnesite (MgCO<sub>3</sub>) and dolomite (MgCO<sub>3</sub>.CaCO<sub>3</sub>);

the latter has been discussed in the article on calcium. Magnesite is used in the production of carbon dioxide and magnesium salts; also for refractory bricks, furnace linings, crucibles and in the paper and sugar industries. Dolomite is used in large-amounts in agriculture for the correction of magnesium deficiency and acidity in soils, though the material used is more often magnesian limestone than a true dolomite. Dolomite is an important building material and, like magnesite, is used for furnace linings and the preparation of carbon dioxide.

The Stassfurt and similar saline deposits contain carnallite (MgCl<sub>2</sub>.KCl.6H<sub>2</sub>O), kieserite (MgSO<sub>4</sub>.3H<sub>2</sub>O), kainite (KCl.-MgSO<sub>4</sub>.3H<sub>2</sub>O), polyhalite (2CaSO<sub>4</sub>.K<sub>2</sub>SO<sub>4</sub>.-MgSO<sub>4</sub>.2H<sub>2</sub>O), and boracite (6MgO.MgCl<sub>2</sub>.-8B<sub>2</sub>O<sub>3</sub>). Periclase is the naturally occurring oxide MgO, and the genistone spinel is an aluminate (MgO.Al<sub>2</sub>O<sub>3</sub>). Epsom salts have the composition MgSO<sub>4</sub>.7H<sub>2</sub>O. (hydrated magnesium sulphate) and are of medicinal value.

## Magnesium in Ocean Water, etc.

Of the five million cubic miles of salts estimated to be in solution in the waters of the ocean, magnesium compounds make up



Magnesium Deficiency in Cauliflower.

almost 16 per cent., considered to be distributed as magnesium chloride 10.88 per cent., the sulphate 4.74 per cent., and the bromide 0.22 per cent. Large scale extraction of magnesia from sea water is now carried out in America. The waters of the

Dead Sea and other brines in central and north-west Asia contain more magnesium than sodium salts. Magnesium compounds, particularly the sulphate and chloride, are of wide occurrence in ground-water, springs and rivers. The element is present also in the colloidal adsorption complex of the soil. Some mineral springs in Java contain magnesium iodide.

Magnesium occurs in meteorites, and spectrum analysis proves its presence in the sun and stars.

# Magnesium in Living Organisms.

One of the most important chemical compounds known in nature is chlorophyll, the green pigment of the leaves and other parts of plants. It contains magnesium and occurs in two forms, chlorophyll a (C55H72MgN4O5) and chlorophyll b  $(C_{55}H_{70}MgN_4O_6)$ . presence is necessary for the all-important process of photosynthesis, by which water and carbon dioxide are converted to sugars and other organic compounds, the energy required being obtained from sunlight. This stored energy is then available, not only for the living process of the plant, but for the whole animal kingdom, which ultimately obtains its energy by feeding on plant material. Similarly, the energy stored in coal seams, oil deposits and oil shales in past geologic ages, represents solar energy converted to fuel through the medium of chloro-The haemoglobin of animal blood has a somewhat analogous composition, with iron instead of magnesium as the metallic element present.

Magnesium is considered an essential element for all plants, including those which do not contain chlorophyll. Plant ash usually contains more calcium than magnesium, but the reverse holds in the case of seeds. Magnesium compounds accompany those of calcium in animal bodies, being found in the skeleton, blood, milk, etc. The inorganic parts of marine organisms almost invariably contain magnesium.

# Magnesium Deficiency in Plants.

Magnesium starvation of plants causes yellow-brown mottling, with a raggedness and downward curling of the leaves, the older ones being first affected. Magnesium deficiency is fairly common in eastern New South Wales, and where liming is necessary the use of dolomitic material is usually recommended.

Excessive amounts of magnesium salts are, as in the case of sodium salts, harmful to plant life. The magnesium content of waters has also to be considered in connection with stock watering, magnesium salts being more harmful than those of sodium because of their greater scouring action. The proportion of magnesium salts in the total salts of stock water should not be more than 1 to 25.

## Metallic Magnesium.

Magnesium metal is obtained usually by the electrolysis of fused carnallite. It has become of outstanding importance of recent years in the preparation of alloys with aluminium for aeroplane construction. It is also used in electric batteries, in flashlight powders and in pyrotechnics; also as a reducing agent in brass manufacture, and in thermite mixtures.

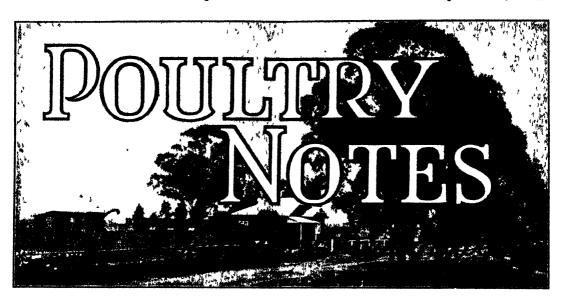
Magnesium and its compounds find many uses in industry and in the chemical laboratory. Several organic magnesium compounds, known as Grignard reagents, are of particular value in organic syntheses. Many magnesium salts have been used in medicine.

#### Occurrence in New South Wales.

Apart from its occurrence as a normal constituent of rocks, magnesium compounds form commercially valuable deposits of magnesite and dolomite, both of which have been obtained in large quantities in New South Wales Production in 1938 was 25,539 tons of dolomite and 19,158 tons of magnesite. Magnesite was first quarried at bifield in 1909. Other localities in which it is found are Attunga, Barraba, Cobar and Warialda. Dolomite occurs at Mt. Knowles, Endgegong, Clandulla and Mt. Fairy.

(To be continued.)

Help Win the War.—Buy War Savings Certificates.



# Prepare for the Breeding Season.

A GOOD deal of uncertainty exists among poultry farmers regarding the extent to which hatching operations should be carried out during the coming season, and while no one can forecast at present exactly what the position will be later in the year, it is essential that some definite course be decided upon and arrangements made accordingly.

Owing to the numbers of poultry farmers who have relinquished operations – and this has resulted in somewhat reduced production — and because there should be an increase in consumption due to a considerable influx of people into this country, it is apparent that there will be a smaller surplus of production during the next season

This, coupled with the fact that cheaper wheat is to be made available to commercial pig and poultry farmers, as announced by the Minister for Commerce, should result in an improvement in returns during the rest of the year

The shipping position might present difficulties in connection with the disposal of the surplus next season, but there appears no reason why this surplus if converted into powder could not be stored awaiting shipment, the matter being largely one of finance

In the circumstances, the only course for poultry farmers to follow is to lay down a programme of hatching and rearing operations which will provide sufficient pullets for the maintenance of existing flocks without attempting to increase numbers.

# Table Poultry Position.

The position with regard to table poultry is somewhat obscure, but it is apparent that with the curtailment of export operations there will be a reduced outlet, though there should be some increase in local consumption. It cannot be expected, however, that demand will be as great as hitherto, and only good quality birds will be required. Thus only those in a position to handle early hatched birds under good conditions should attempt to rear any large numbers.

# Breeding and Hatching Preparations.

Those who carry out their own breeding and hatching operations will require to make preparations during this month, and in cases where additional breeding stock has to be purchased, no further time should be lost in securing requirements. The same applies to those who propose to purchase day-old chickens, as in these uncertain times many hatchery men will hesitate to fill incubators unless definite orders are received beforehand.

# Get the Breeding Stock Ready.

Those who have to select a large number of breeding stock will find that the time that can be devoted to this work after carrying out the regular farm routine is somewhat limited, particularly if there is any shortage of labour, and where it is desired to make a start with hatching operations by June, it is essential to commence selection without delay. As a first consideration, see that the pens for the breeders are ready to receive them.

It is advisable to pick out more birds than are actually required in order to leave a margin for rejection, which is always necessary, despite careful initial selection. Any birds showing scrious standard defects should be rejected, and careful attention should be given to physique and to laying characteristics.

# Under-weight Eggs.

In cases where any difficulty is experienced with undersized eggs, it is a good practice to trap nest the birds to eliminate any which do not lay eggs of a 2-ounce standard. A certain tolerance, of course, must be allowed in the case of pullets, but these should produce full-sized eggs by the time the breeding season actually commences.

It will be found that a number of pullets lay some eggs of 2 ounces in weight and over, but also a large proportion of underweight eggs, and such birds should be rejected. On the other hand, there would be no necessity to exclude pullets which lay a few small eggs over a period, as most birds will be found to produce occasional small eggs, particularly birds of the heavy breeds which go broody, in which case a small egg or two is often laid before the bird shows signs of broodiness.

#### Care of the Males.

In cases where second-year male birds or advanced cockerels are being used it is advisable to place them with the hens as early as possible, but if hatching operations are not being commenced early in the season it is necessary to keep a check on the males to see that they are remaining in good condition. Some stand aside and allow the hens to eat the food, thus becoming poor with adverse effects on their fertility. In cases where the males show any loss of condition, they should either be taken out of the pens or fed apart from the hens and given a feed of maize at midday. This can be done either by shutting the hens in the

house and leaving the male bird in the yard, or by placing tins of maize in the pens at a height which the hens cannot reach but the male birds can.

It is important that the male birds do not become heavily infested with body lice, as this will affect hatching results. The birds should be examined at least once a month, and where infestation has occurred a thin line of nicotine sulphate should be painted along the top of the perches just at dusk. If the application is made any length of time before the birds go to roost it will be ineffective.

## Dubbing and De-spurring.

Where second-year or older White Leghorn or other light breed males are used, it is often beneficial to dub the birds before placing them in the breeding pens. The operation should, of course, be carried out



Showing Where to Cut the Comb and Wattles.

some weeks before the birds are required, in order that the comb will be properly healed.

In some cases, too, it might be advisable to dub cockerels—where a cankerous sore has eaten into the base of the comb, causing it to fall over on one side—but as a general practice this should not be necessary, as birds with weak or extra heavy combs should not be used.

Many poultry farmers do not practise dubbing because they do not know how to perform the operation. To carry out this work it is necessary to use an ordinary blade razor or pair of sharp scissors, but preferably a razor. The birds should be wrapped in a bag with the head protruding at one end and the legs the other. An assistant should hold the legs of the bird with one hand and place the other firmly on the bag

to prevent flapping of the wings.

The operator should then cut up to an inch off the bottom of the wattles, following their natural shape. The wattles are cut because they usually grow longer when the comb is cut, and they may interfere with the bird eating. The comb should then be held at the back and cut along a curve, following the shape of the head, but no closer than 34 inch above the head at the thickest part of the comb. The exact line of the cut will depend on the nature of the comb; if it is thin, the cut can be made nearer the head, but if thick, it is necessary to keep higher in order to avoid undue bleeding.

If bleeding to any extent continues a few minutes after the comb is cut, an application of an alum solution made by dissolving alum in as little water as possible, or applying finely powdered alum, will usually staunch the flow of blood.

# De-spurring.

Long or sharp spurs should be cut before the commencement of the breeding season and this can be done with a hacksaw or any small saw with fine teeth. In the case of second-year or older birds, the spurs can usually be cut to within about ½ inch of the leg without causing much bleeding, but spurs of cockerels which become too sharp should have only the points removed.

If much bleeding follows cutting the spurs of any bird, it can be stopped by the application of a piece of hot flat iron to the cut surface.

# Egg Quality Troubles

Many complaints are received from country centres regarding the low grading of eggs by the Egg Marketing Board, and consequent low returns to the producers concerned. In most instances, however, the Board contends that the eggs are correctly graded, and factors in the production or handling of the eggs before they are marketed are responsible for their poor quality. Much could be done to prevent the deterioration in quality if producers are prepared to follow some simple directions in handling their eggs.

When producers consider that they have any cause for complaint it is suggested that they make contact with the manager of the branch or depot, and if possible, arrange to see a consignment or two of eggs candled and graded. Such a procedure is welcomed by the Board, and by having any faults pointed out the producer would be in a better position to rectify them. On the other hand, if there are grounds for complaint, adjustments can be made.

# Points on Care of Eggs.

The first essential in the handling of eggs is to collect them regularly every day, or preferably twice per day, and then place them in the coolest room available to cool down before cleaning or packing. Any eggs

found in stray nests should not be included with the others.

It is important that eggs should not be washed for at least five or six hours after being laid, as this is a frequent cause of rots developing if bacteria responsible for rotting are present. When hand washing has to be done, it should be carried out under strictly hygienic conditions, making frequent changes of the water, and the eggs should be dried with a towel as quickly as possible and not allowed to stand in the sun or open air to dry. On no account should eggs be soaked in water or washed with dirty cloths. When cleaning by machine, every care must be taken to keep the machine in a sanitary state by cleaning it daily and disinfecting with a non-tainting disinfectant such as sodium hypochlorite preparations in about 2 per cent. solution, or, failing such disinfectants, household soap or soap powder should be used liberally with vigorous scrubbing.

Eggs which are lightly stained can usually be cleaned by rubbing with ordinary washing soda in powder form on a wet rag and then washing. It should be realised that the inclusion in the pack of eggs which are slightly soiled or stained results in their being graded as "reject hen" or "case eggs" and these are paid for at lower rates. COMMONWEALTH DEPARTMENT OF HEALTH.

# **ENTERO-TOXAEMIA**

("PULPY KIDNEY")

# in SHEEP and LAMBS

PREVENT THIS DISEASE
BY USING "COMMONWEALTH" ENTERO-TOXAEMIA VACCINES.

# (a) Entero-Toxaemia Vaccine (Alum-precipitated). This vaccine confers a higher immunity than that which follows

This vaccine confers a higher immunity than that which follows the ordinary type of vaccine.

# Dosage: A single dose of 5 cc.

(NOTE:—In flocks where the mortality is expected to be heavy or where mortality still occurs after a 5 cc. dose has been given, a second dose of 5 cc. should be administered.)

For Pregnant Ewes.—A 5 cc. dose followed by 10 cc. A month's interval should elapse between each dose, and the second dose should be given about a fortnight before lambing.

This method of vaccination is destined to protect lambs during the first three or four weeks of life.

(NOTE:—The above vaccine is not recommended for vaccinating export lambs at the usual sites, such as inside the thigh or in the region of the brisket, on account of the possibility of blemishes occurring in the dressed carcase.

The vaccine may be used in such lambs at sites which would not affect the dressed carcase, such as the loose tissue just above and inside the knee.

Alternatively, if it is not desired to use the alum-precipitated vaccine, the following vaccine may be used.)

# (b) Entero-Toxaemia Vaccine.

DOSAGE: For sheep or lambs—A single dose of 5 c.c.

(NOTE:—In flocks where the mortality is expected to be heavy or where mortality still occurs after a 5 c.c. dose has been given, a second dose of 5 c.c. should be administered)

THE VACCINES ARE USED FOR THE PREVENTION AND NOT THE TREATMENT OF THE DISEASE.

PRICES:

# 1 bottle containing 50 cc. . . . 1/6d. 1 ... ... 100 cc. . . . . . 2/1 ... ... 250 cc. . . . . 3/6d. 1 ... ... 500 cc. . . . . . 6/1 ... ... 1,000 cc. . . . . 10/-

Set of 6 bottles, each holding 1,000 cc. . . 50/-

The above vaccines are available from the Chief Quarantine Officer (General), Customs House, Circular Quay, Sydney, and the Commonwealth Serum Laboratories. The vaccines will be despatched within 24 hours of the receipt of orders.

Containers will be forwarded per train or post as desired immediately on receipt of order. Freight or postage extra.

Stockowners should state whether they require Entero-Toxaemia Vaccine (Alum-precipitated) or Entero-Toxaemia Vaccine.

# COMMONWEALTH SERUM LABORATORIES

PARKVILLE, N.2, VICTORIA.



The Agricultural Gazette.

May, 1942.

# Wanted.

# A Federal Agricultural Executive.

THE problem of ensuring adequate supplies of agricultural products for civil and military requirements (wisdom suggests we should aim at surpluses rather than bare necessities in the present uncertain circumstances) is likely to tax to the utmost Australia's production capacity, even given the greatest measure of co-ordinated direction and planning. In the absence of such co-ordination the task is almost certain to prove impossible.

Lack of co-ordinated Federal direction of the Commonwealth agricultural effort has been the subject of much comment and discussion for a considerable time in more recent months suggestion and criticism of this national shortcoming has crystallised into concerted moves by representative primary producer organisations and other bodies interested in agricultural development to impress upon the Commonwealth Government the urgent need for co-ordinated planning.

The schemes outlined by these several bodies vary in detail only, all seem worded to the idea of a Federal agricultural executive with comparable constitution and authority to existing Directorate-Generals in other defence industries. The suggestion has also been advanced that the Federal executive should delegate executive authority to each State Department of Agriculture, which should be assisted by a council representing all sections of primary production. District planning committees have been suggested as a means of implementing the decisions of the State executive

Phese ideas are very closely followed in general principle in the resolution agreed to by a conference recently convened by the Agricultural Bureau of New South Wales and attended by representatives of practically every primary producers' organisation of standing in the The Conference recommended to the Federal Government . "That a Federal Executive, with a research secretariat, and assisted by State Committees, be set up with Federal Government authority as soon as possible. Such executive and committees to be composed substantially nominees of primary producers' organisations with a Government nomince as chairman."

Nothing short of a Federal agricultural executive, clothed with ample power, and enjoying the fullest confidence of the military and civil authorities (particularly the former), on the one annother than the one hand, and of the producers, on the other, would appear to be capable of doing the job satisfactorily. Among other things, the choice of Australia as an Allied strategic base in the Pacific war zone has already introduced, and will continue to do so, many unusual features into our agricultural economy. These factors, although impossible of determination by statists or economists, are known to the few who plan and direct the Allied war effort in the southwest Pacific. Whoever directs Australia's wartime agricultural plan must necessarily share in many of the secrets guarded by the trusted few. In the absence of details concerning projected troop movements both into and perhaps out of Australia for months ahead, for instance, attempts to plan now for requirements at harvest time become mere pretence. Even the allocation of production of certain crops to the least vulnerable States or portions of States, presumably a consideration of no little importance if invasion is actually feared, can be lifted out of the sphere of guesswork only by possessing knowledge at present available only to military strategists.

It would seem that more information would have to be released to a Directorate-General of primary production than to Directorate-Generals in any other wartime production fields. Diffidence on the part of the Commonwealth to entrust such vital information to even one more individual perhaps explains to some extent the inaction to date, but the contemplated risk must be extremely great if it exceeds the harm done to the war effort by continued lack of co-ordinated planning in the agricultural field.

True, a Directorate of Defence Foodstuffs has already been created, but its functions, in the absence of co-ordination of civil and military requirements, could aggravate the general problem. At present, producers are given the choice of producing, under contract, for the fighting forces or of producing, without any form of guarantee either as to price or labour, for the open market, whence civilians obtain their needs. In the circumstances, it is not unreasonable to assume that the open market will be either neglected or catered for only indifferently. Actual production for the combined requirements of civilians and fighting forces presents no-additional difficulties in direction or planning; it is simply a question of quantities, and no great exactness is called for in this regard if, as suggested, the aim be for surpluses in as many lines as possible.

# Labour for Vegetable Production.

SINCE the inauguration of the programme of vegetable production under contract to the Defence Food Control Directorate, the Division of Plant Industry of the Department of Agriculture, which is arranging the contracts, has learned of many instances where intending growers have been unable to undertake contracts owing to the sudden calling-up of their labour for military service. The loss of such contracts for the supply of vegetables to the Allied fighting forces in Australia is not in the best interests of the war effort, and the Department has now made arrangements with the Deputy Director of Manpower in New South Wales to prevent the further occurrence of such loss

Growers who intend to undertake vegetable contracts, or who are at present negotiating for them, should immediately notify the National Service Officer in their district, so that the labour

at present engaged on such farms can be reserved' from military call-up for a limited period. It is essential that intending contract growers should give this notification as early as possible, as it may be some weeks before field officers of the Department will be able to reach all intending growers and to finalise the contracts. When the contracts are signed, the Agricultural Instructor will certify on the contract form to the specific labour required to fulfil the contract. The grower will then submit a copy of the certified contract form to the local National Service Officer, who will accept it as a basis for the reservation of the necessary labour.

The Department of Agriculture has made no arrangements with the Deputy Director of Manpower for the reservation of any labour required for vegetable growing other than that necessary for the contract production of vegetables for the fighting forces.

THE ENEMY LISTENS.

Don't let the Fighting Services down by passing on secret information in your possession.

GUARD YOUR TONGUE.



# The Chemical Composition

# Of Pasture

# As Related to Animal Nutrition.

A. W. MILES, B.Sc., A.S.T.C., Chemists' Branch.

THIS is the first of a series of articles dealing with the chemical composition of pasture and its relation to feeding value. The introductory articles discuss the significance of the constituents of pasture so that the stockowner may appreciate the bearing which they have upon pastoral practice.

The great majority of the sheep, cattle and horses in New South Wales are maintained throughout the year entirely on pastures and naturally occurring forage. In 1940 the number of these animals in the State was over 57,500,000, and the value of the products obtained from them was roughly £49,000,000, even though the year was one of drought in main districts. Our pastures are thus the source of most of the return from livestock, and as such are an important raw material and a major national asset, and their feeding value is a very important consideration.

Before the various aspects of the feeding value of pastures are considered, however, it is necessary first to have a knowledge of the nutrients or food constituents which the plants contain, and how these nutrients are used by the animals in the production of beef, butter, wool and milk.

#### Composition of Pasture.

The tissues of plants are very complex, being composed of a large number of different substances. Although many of these can be separated individually from the plant tissue by chemical means, it is not usually expedient to do so. Instead, the many substances are grouped into a relatively small number of classes, and when the plant material is analysed, it is the amounts of material in each class which are expressed in the analysis. The first analytical determination usually made separates the plant material into

moisture and dry matter. Succulent grass contains 70-80 per cent. of moisture, and some clovers may contain 90 per cent., whilst an apparently dry material, such as hay, may contain 10 per cent. of moisture. In the chemical laboratory the moisture is determined by completely drying the material in an oven, hence the dry matter which is left is sometimes called oven-dry or moisture-free matter.

If we burn a tree, or a sample of grass, we notice that the greater portion of the material is combustible, leaving behind a white ash. In the laboratory, the ashing is carried out under special conditions, and the material which burns away is called the organic matter. The ash may be divided into insoluble ash and soluble ash, whilst the substances in the organic matter are usually grouped into four classes, namely, fat, protein, carbohydrate and fibre.

## Utilization by the Animal.

When pasture grass is eaten by the grazing animal, changes take place in the digestive tract, and part of the grass is digested, the residue being excreted in the droppings. The term coefficient of digestibility is used to describe the percentage of the dry matter of a foodstuff which can be absorbed by a particular kind of animal. This term is also applied in the case of individual nutrients; thus we may speak of the co-efficient of digestibility of the protein or fibre in a particular foodstuff. Care should be taken, however, that this is not confused with the percentage of digestible protein, etc. For example, a particular grass may contain 8 per cent. of protein, of which half is digestible; the co-efficient of digestibility for the protein is thus 50 per cent, but the percentage of digestible protein in the grass is half of 8 per cent. or 4 per cent

of 8 per cent. or 4 per cent

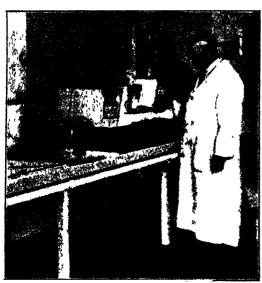
The digestive system of the sheep is similar to
that of the cow, both being cud-chewers (or
ruminants), and co-efficients of digestibility obtained for one animal are frequently used for the
other. The digestive system of the horse is quite
different, and separate co-efficients should be used

for this animal.

All the fat, protein, carbohydrate, and fibre which are digested, undergo chemical change in the body of the animal, but only a portion of the digested mineral matter, or ash, undergoes such change, some being passed back through the intestine to be voided in the droppings, and the rest being taken out of the bloodstream by the kidneys and excreted in the urine. Some of the protein which the animal cannot use is also excreted in the urine, but in its passage through the body it has been altered and appears in the urine mainly as urea.

# FUNCTION, OF INDIVIDUAL NUTRIENTS. Carbohydrates.

The carbohydrate (nitrogen-tree extract) present in a pasture or concentrate includes the sugars, starch and substances of similar nature to starch. Sugars may be present in appreciable amounts in such fodders as sugarcane and Saccaline sorghum, but in most feedingstuffs the amount present is very small and the bulk of the carbohydrates consists of starch and other substances. When carbohydrates are digested they are changed into simple sugars. These sugars pass into the



Determining the Ash Content of Pasture Plants in the Laboratory.

bloodstream, and may be immediately used by the animal in the production of energy, or else stored in the liver, turned into body fat, or, in the milking animal, used to form the fat and sugars in the milk. As the body fat may be used at some future date for the production of energy, it may be regarded as an energy reserve.

#### Fats.

The values of the individual carbohydrates for energy production or for the formation of fat, are about the same.

Fat.—The term fat, as used in pasture and fodder analysis, includes, not only the true fats and oils, but also waxes, etc. However, the amount of waxes, etc., present is small, and is

usually disregarded. Digestible fat is used in the animal body for the same purposes as the carbohydrate, but is a more concentrated source of energy.

#### Fibre.

Fibre (crude fibre) is the least digestible part of the organic matter in a fodder. Actually, fibre cannot be digested by an unaided animal stomach, and any digestion which does take place is effected with the aid of the innumerable bacteria which are present in the paunches of sheep and cattle, and in the intestines of the horse. These bacteria excrete chemical substances which act on the fibre, changing it to a form in which it is easily digested by the animal. This, of course, is done by the bacteria for their own food purposes, any advantage to the animal whose digestive system they inhabit being incidental. The bacteria in the paunch are, by the way, responsible for the production of "bloat" in cattle.

The part of the fibre which is digestible supplies energy, and is used for the formation of body fat. Nevertheless, a high percentage of fibre in a feedingstuff is always considered to lower the value of the feedingstuff, for the following reasons:—

It has been found that the fibre content of pasture grass increases with advancing maturity, and that as the fibre content increases, its digestibility is lowered. Increase in fibre content also lowers the digestibility of the protein and carbo hydyrates, and decreases the availability of the lime and phosphoric acid Generally speaking, pastures and fodders high in fibre content are low in protein and carbohydrate, and the digestibility of the nutrients is also low Thus, in the following example, an increase in fibre content from 21 per cent. in immature grass to 35 per cent. in mature grass causes a drop in the digestibility of the dry matter from 70 per cent. to 60 per cent.

	Co eff	oility (for	or sheep		
	Dry matter	Pro- tein.	I ibre.	Carbo- hydrate	Fat.
na- ent of	per cent. 70	per cent. 66	per cent. 70	per cent. 75	per cent. 62
na ent of	60	62	   66	61	46
ا .	_	·	·	<u>'</u>	

Mixed grasses, immature (fibre content is 21 per cent. of total dry matter).

Mixed grasses, mature (fibre content is 35 per cent. of total dry matter).

#### Protein.

Protein is the name given to a group of complex substances which are a necessary part of any living tissue. White of egg is one kind of protein; hair and gelatine are others. Many other kinds of protein are found in the animal body, and these comprise the bulk of the muscles and sinews, skin and internal organs. Animal tissue contains, generally speaking, much more protein than does vegetable matter, and the individual proteins of the former are very different from those of the latter.

Now, whilst some of the proteins (such as white of egg and gelatine) have apparently very little in common, they are related chemically, all containing nitrogen and all being built from a number of simpler chemical compounds, known as amino-acids. By re-arrangement of the aminoacids from one protein, another may be formed. This is what takes place in the animal body, the amino-acids of the proteins of grass being rearranged to form the proteins of muscle, braintissue, etc. About twenty different kinds of aminoacids are found in natural proteins, but only a certain number of these are actually needed by the animal in the building-up of the proteins of its body. These essential amino-acids are not always present in the right amounts in the pro-teins of feedingstuffs. For example, maize grain is not a satisfactory ration if fed alone, mainly because its protein is deficient in one of the amino-acids required by animals.

Thus, the quality of the protetin of a feedingstuff, as well as its quantity, must be considered, the quality depending upon the relative proportions of the essential amino-acids which are present.

Besides being used for tissue-building, protein can also be used in the same manner as the carbohydrate and fat for the production of energy and for the storage of energy in the form of fat, etc. However, weight for weight, it is not as useful for these purposes as the carbohydrate. It also

suffers from the disadvantage of speeding the energy wastage from the body. The ideal is to supply the animals with the minimum amount of high quality protein necessary for tissue-building, etc., leaving the supply of energy to the carbohydrate portion of the diet.

#### Minerals.

The insoluble ash (silica) is the part of the ash which cannot be dissolved; thus it cannot be digested and is of no use to the animal.

The soluble ash contains all the valuable constituents of the ash, of which the most important are lune and phosphoric acid. Both of these minerals are necessary for bone formation, and together make up a large percentage of the total matter of the bones. Lime and phosphoric acid also enter into the composition of the blood serum, and the latter mineral is necessary in the formation of some of the proteins. Both minerals are present in milk. Salt is another important mineral, but is usually supplied as a lick.

Other essential mineral elements are iron, copper, sulphur potassium, magnesium, iodine, cobalt and manganese Deficiencies of these rarely occur, and when they do, are usually confined to particular areas where the soil and water are lacking in the particular element concerned.

(To be continued.)

# Six Thousand Tons of Onions Required.

THE Defence authorities require 6,000 tons of onions from New South Wales growers this year. The contract price has been fixed at £11 per ton.

Production quotas have been allotted to different districts, and the County of Cumberland, together with the neighbouring districts of Camden and Gosford, is being asked to produce 1,000 tons. Onions are an easy crop to grow and will give good returns at the guaranteed price of £11

Varieties recommended for planting in all parts of this area at the present time are Hunter River Brown, Hunter River White, Prizetaker, Sweet Spanish Valencia and Golden Emperor. In the colder areas such as Camden, Long Keeping Brown Spanish and White Imperial may also be grown. Onions prefer a friable, sandy loam soil with a high humus content, and provided the soil is clean and free from weeds the onion seed can be sown direct in drills 1/2-inch deep and from 12-24 inches apart. About 3 lb of seed are re-

quired to sow an acre. Direct sowing should not be done in heavy soils which are liable to cake, as the young seedlings may fail to push through the soil. Onions sown direct in drills need to be thinned out in the seedling stage.

Seed may also be sown in seed beds for subsequent transplanting into the field. In this case only 11/2-2 lb. of seed will be required per acre. Transplanting should be done when seedlings are 4-6 inches high, and the plants should be spaced 4-6 inches apart. At transplanting, the tops should be cut back to within I inch of the crown and the roots should be trimmed to about 1/2 inch in length. Transplanting should always be done on the heavier soils or in any soils where weed growth is likely to be troublesome. Onions cannot compete with weeds in the early stages of growth, and it is essential that they should be kept free from weeds. Much of the weeding could easily be done by school children, and it would be a very definite way in which children could make a substantial and very practical contribution to the war effort.

SILENT SERVICE. Talking will Not Win the War. It may lose it!

# Gully Reclamation.

# Experiences at Cowra Experiment Farm.

R. W. McDiarmid, Faim Manager.

ON many wheat farms in New South Wales gullies have been eroded in cultivation paddocks, thus rendering normal cultural operations very difficult. In such cases many areas that would ordinarily be one large paddock must be worked as a number of areas, thus entailing extra work and decreasing the efficiency of the general farm management.

The excellent results that were obtained at Cowra Experiment Farm in the filling in of such a gully are described in this article. They indicate that even large gullies can be successfully filled in and the paddock brought back to normal cropping by

Fig. 1.- The Gully Before Treatment.

use of ordinary farm machinery or implements which can easily be made by the farmer himself.

During September, 1941, a gully which had become longer and deeper as time went on, until it was 12 chains long, 8 to 10 feet deep and 20 to 25 feet wide, and had several small washes running into it which were up to 1 chain long, was filled in. Fig. 1 shows a view of it taken from the outlet, and gives an indication of the size of the wash. The success of the work may be judged from Fig. 2, which shows the view from the same spot when the work was

completed. Fig. 3 was taken shortly after filling-in was commenced and gives an idea of the sheer drop of the sides.

The first operation consisted of filling-in the small laterals so that ploughing could be carried out up and down the edge of the main gully. The small laterals were filled in a similar manner to the large gully.

A single furrow plough, pulled by one horse, was used, up and down the length of the wash, as near to the edge as possible. This operation pushed a large quantity of soil into the centre of the wash and



Fig. 2.—The Gully Filled In.
Viewed from the same spot.

broke away the steep bank to a limited extent; it was continued until a road plough, pulled by four horses, could be used (Fig. 4) round the top of the gully in a similar manner to the small single furrow. Then followed the use of a home-made delver constructed of old railway sleepers, and



Fig. 3.—View of Gully Sides. Note the depth and sheer drop.

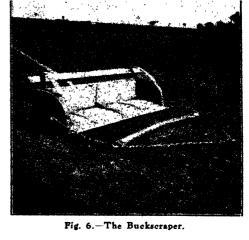




Fig. 4. - The Single-furrow Road Plough in Use.

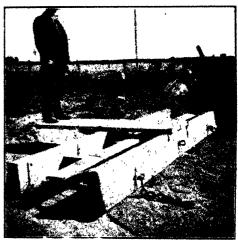


Fig. 7 .- A Home-made Leveller.



Fig. 5.—Using the Delver.



Fig. 8.—A Contour Bank Constructed Across the Wash to Divert Excess Water.

having a main beam of 9 feet and wing 4 feet 6 inches; the wing is set at an angle of 45 degrees to main arm and with it the soil was pushed over the edge into the bottom of gully. (See Fig. 5.)

A four-furrow disc plough was used to replace the road plough as soon as the bank had been broken down sufficiently. implement did excellent work, being used gradually to work soil from the edges to

the bottom and centre of gully.

The disc plough soon broke the sides down sufficiently to allow the use of the "buckscraper" (see Fig. 6) across the wash. This scoop was pulled by four horses and carried three-quarter to one cubic yard of soil per trip. It was used to carry soil from nearby areas to the wash.

The final levelling and filling-in was accomplished by means of home-made wooden leveller, which is illustrated in Fig. 7. This implement requires four to six horses, depending on nature of work, and is 12 feet long; the main beams are 12 inches x 4 inches oregon planks, on edge.

After final levelling contour banks were constructed in paddocks in such a manner as to allow excess water to flow gradually into natural watercourse, as can be seen in Fig. 8., instead of rushing straight down the slope and scouring, as in Fig. 1. These banks were wholly constructed by means of the four-furrow disc plough, which has been found, in the past, to be a satisfactory implement for the job. A crop of oats was drilled into the area after the contour banks had been completed with the object of holding the soil until it compacted and settled down.

The whole operation of ploughing, delving, scooping, grading, contouring and sowing occupied fifteen days, and during that time four men were continually employed.

# Selected Citrus Buds.

# The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only from such buds should undoubtedly be more profitable and appeal to all progressive orchardists

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen

during the 1941 budding season, trees from which should be available for planting during the 1942 season —

	Washing- ton Navel	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lisbon Lemon.	Emperor Mandarin.	lotal.
Adamson, T	4,000	4,000		2,000			10,000
Cambourn, H	. 3,500	5,000		3,000	•••	•••	11,500
Catt, F. D	3,000	3,000		3,000	1,000		10,000
	5,000	5,000	1,000	2,000	***	•••	13,000
	1,000	1,500		500			3,000
	2,500	2,500			•••		5,000
	1,500	1,000		1,000	1,000		4,500
	10,000	15,000	2,000	5,000	1,000	800	33,800
				2,000	•••	***	2,000
	. 3,500	5,000	750	500	250		10,000
Swane Bros	5,000	2,000	1,000	1,000	1,000	800	10,800
	39,000	44,000	4,750	20,000	4,250	1,600	113,600

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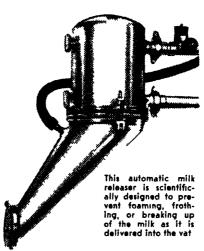


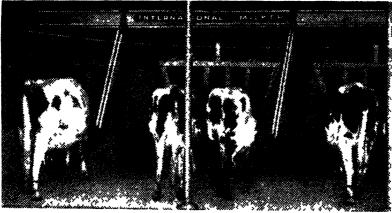
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# BARLEY GRAIN FOR STOCK FEED.

# May be Used Economically for Most Animals.

G. L. McClymont, B.V.Sc., Veterinary Officer.

THE recent action of the Barley Board in releasing a large quantity of barley grain for stock feeding purposes has brought many enquiries as to its value and the best methods of feeding it from men unaccustomed to using this grain.

Many stockowners will be interested to know that barley grain is one of the best feeds for pigs, producing the desired quality of carcase, with firm, white fat, and that it differs little from other cereal grains in its value for sheep and cattle. As a feed for horses it has long been valued in other countries, and for poultry, it can replace either maize or wheat in all types of rations.

# The Economic Aspects.

Considering the economic aspects of purchasing barley for feed, it is readily seen that, as the bushel weights of the different cereal grains vary widely (oats 40 lb., barley 50 lb., maize 56 lb., wheat 60 lb), and their food values for the different classes of stock also vary, it is valueless merely to compare the bushel prices.

The following figures may be used for determining which are the cheapest feeds for each animal, the figures being used to divide the bushel prices of the grains:—

Poultry, pigs and horses.—Oats 24, barley 34, wheat 44, maize 44.

Dairy cattle and sheep.—Oats 29, barley 38, wheat 47, maize 14.

Thus, maize at 5s. per bushel and barley at 3s. per bushel may be available for feeding sheep. To find the price of a food unit (1 lb. of starch equivalent) in maize, divide 5s. by 44; the result is approximately 1.4d.; in barley, divide 3s. by 38; the result is approximately 1d. That is, barley is the cheaper feed. Small differences, i.e., less than . Id., in the price of food units should be disregarded as not of practical importance. The prices used as a basis should be the cost of the food landed on the property and should include cost of grinding if necessary.

To make the most profitable use of this grain it is necessary to know the best methods of feeding barley to each type of animal.

# As a Pig Feed.

Barley has long been recognised as one of the best pig feeds because of the quality of carcase produced, the fat being of the required firm, white type. The grain is best fed ground, but fine grinding is to be avoided, as a pasty, unpalatable mass may result when it is chewed. Estimates of the increase in food value gained by grinding range from 11 to 22 per cent., so that it can be readily seen that the extra trouble is well worth while. Soaking the grain may seem to be an alternative to grinding, but it has been found actually to decrease the food value for pigs, 100 lb. of ground barley equalling 113 lb. of whole dry barley or 126 lb. of whole barley soaked.

Owing to its low protein content, barley, as with all other cereal grains, must, to give economical returns, be fed with some protein supplement such as skim milk, whey or meat meal, green feed, and a calcium containing lick such as four parts ground limestone and one part salt. When self feeders are used a simple method is to feed 10 per cent. of meat meal in the ground barley for the first four weeks after weaning, 71/2 per cent. for the second four weeks, 5 per cent. for the third and fourth four weeks and none at all from then till marketing. An alternative to the meat meal is the provision of 34 gallon of skim milk daily.

Maize grain is slightly more efficient (5 to 10 per cent.) than barley as a pig food, oats is 5 to 15 per cent. less efficient and wheat 3 to 4 per cent. more efficient, so that barley compares quite well with other grains.

# Skilful Feeding Necessary with Cattle.

Grinding or rolling pays when feeding cattle with barley grain. Experiments have indicated that, in a ration for dairy cattle, all cereals grains have only a small difference in their feeding values. Barley suffers a slight disadvantage in that when fed as the only grain to cattle, bloating is more likely to occur than with the other grains, so that it should be fed, as is usually done, with other feeds such as hay and bran. Its palatability for cattle is also less than that of the other grains, so that more skilful feeding may be necessary to keep cattle up to their full appetite and, consequently, full production. Being low in protein, barley and the other cereal grains must be fed with some protein supplement, of which peanut, linseed and copra meals and gluten feed and meat meal are the most suitable.

# Used for Sheep in U.S.A.

Sheep have not as yet, in this State, been fed extensively on barley, but in America lucerne hay and barley have long been recognised as an excellent ration for fattening lambs, up to I lb. per head per day of the grain being fed, so that it is seen that there is little risk with heavy feeding of the grain. The value for sheep is not increased by grinding, so that barley is best fed whole in troughs, self feeders or, as a last resort, trailed.

In comparison with the other grains as sheep feeds, harley appears to be about 5 per cent. less valuable than maize, about equal to wheat, and probably of equal or greater value than oats.

For dry sheep, barley grain and paddock roughage, straw or cereal hay would be a sufficient maintenance ration for drought time, but owing to its low protein content a ration balanced by the addition of good lucerne or clover hay, good grazing crops or pasture, meat meal, blood meal or oil meals is necessary for in-lamb or milking ewes. Also where sheep are mainly existing on cereal grain and hay or paddock roughage, as in drought time, I per cent. ground limestone should be mixed with the grain, or a lick of equal parts salt and ground limestone provided, with molasses if necessary to attract the sheep.

# High Food Value for Horses.

Barley grain for horses may appear to be a novel idea to many men accustomed, by force of habit and tradition, to feeding oats, but in Africa, the East and Europe, barley has been well tried and has long been a highly valued horse feed. As it is of higher food value for horses than oats, but not quite as palatable or as easily digested, it is best fed crushed, four parts of barley replacing five parts of oats, and should be introduced gradually into the ration, up to 10 lb. per day being then fed mixed with bran and chaff.

# Can Replace Wheat and Maize for Poultry.

Barley can replace either maize or wheat in all types of ration for poultry, so that where wheat or wheat by-products are unavailable, it can be substituted, weight for weight, in the mash or grain. As barley has a vitamin A content something less than one-sixth that of yellow maize, the green feed supply should be increased, if necessary, where barley is used to replace maize.

# WAR GOSSIP IS DANGEROUS.

Enemy agents are vitally interested in Australia's War Effort.

Don't assist them by discussing what you know about the manufacture and storage of munitions.

# Worm Parasites of Sheep.

# Wartime Economies in Control.

# Shortages of Drugs and Labour.

THE war has created two serious problems for graziers—shortages of drugs and labour. Carbon tetrachloride, nicotine sulphate and phenothiazine are already in short supply and some, if not all, of them may soon be unobtainable. This makes it essential to conserve supplies of these drugs by using them only when essential, making sure that the appropriate drug is used for the particular parasite present, and by substituting other drugs and methods of control.

Shortage of labour renders it imperative to avoid unnecessary handling of sheep. Control measures should aim at preventing outbreaks rather than curing them after

losses have occurred.

Reprinted below are the recommendations made by Mr. H. McL. Gordon,\* B.V.Sc., of the McMaster Laboratory, Sydney, for the most economical and effective use of the drugs which are in short supply and of the labour which is available.

To ensure the conservation of essential drugs the following measures should be adopted:—

- 1. For infections with the large stomach worm use copper sulphate or copper sulphate and arsenic.
- 2. These drugs will remove the large stomach worm in 90 per cent. of sheep.
- 3. Bluestone and nicotine sulphate should be reserved for the treatment of young sheep suffering from small intestinal (black scour) worms.
- 4. If young sheep do not respond to treatment with bluestone-nicotine sulphate remove to a hospital paddock, feed well and treat with phenothiazine.
- 5. Use phenothiazine only for the "tail" of the young sheep suffering from "black scours" and for all sheep suffering from the nodule worm. The latter are usually found in northern New South Wales and Queensland.

#### To Prevent Outbreaks.

A. The Large Stomach Worm.

1. Remember the large stomach worm is a summer parasite, most prevalent in spring, summer and early autumn.

\*" Economy and Efficiency in the Control of Worm Parasites of Sheep," by H. McL. Gordon; published by the Council for Scientific and Industrial Research.

- 2. Risk of infection is increased by a fall of 25-30 points of rain followed by some days of dull, humid weather.
- 3. Treat sheep about three weeks after such periods, and if dull, rainy weather persists for some weeks repeat treatments at three-week intervals until dry or cold weather returns.

B. Small Intestinal Worms.

1. These are parasites of the cooler months, and infection occurs in late autumn, winter and early spring.

2. Severe infections occur after a wet autumn, followed by a dry winter, or a wet winter followed by a dry spring.

3. Treat lambs at weaning time, whether thriving or not, particularly spring lambs weaned in the autumn.

4. Treat young sheep at four to five week intervals from autumn until spring feed comes away, particularly when winter is either very wet or very dry.

5. Treat ewes one month and two months before lambing is due. This will reduce

infection of the lambs.

C. Fluke.

1. Carbon tetrachloride must be used. A l-cc. dose, i.e., 5 cc. of single strength mixture, is ample.

2. On severely affected properties or paddocks drench at the end of April, middle of June and end of July. If moderately

affected, drench at the middle of May and end of July. If slightly affected, drench at the middle of June.

- 3. Treat snail infested areas with bluestone by broadcasting or spraying in June and early November. Before using bluestone, see your Stock Inspector or District Veterinary Officer for detailed directions.
- 4. In dry weather look out for sheep grazing in swamps. Outbreaks of fluke diseases are likely to follow.
- 5. Where black disease occurs vaccinate in October.

# D. Nodule Worm.

- I. Infestation is picked up in spring, summer and early autumn, but effects may not be seen until winter.
- 2. Treat breeding ewes late in August. This will reduce risk of spring lambs becoming infested.
- 3. Treat young sheep in autumn to prevent disease in early winter.
  - 4. Treat all sheep in winter (June-July).
- 5. Use phenothiazine when available, and expense is warranted. Otherwise use enema treatment. Two men can do it, and your Stock Inspector or District Veterinary Officer can show you how to do it.

# Avoid Overstocking.

- 1. Overstocking leads to heavy contamination of pastures with worm eggs.
- 2. It may be general over the whole paddock or may be localised, c.g., in gullies,

frontages, etc., when the remainder of the paddock is bare or dry.

3. Guard against general overstocking by keeping numbers down, especially young sheep and breeders.

4. Look for evidence of local overstocking, and when observed drench the sheep.

## Rotational Grazing.

- 1. Risk of infection may also be reduced by rotational grazing and spelling of paddocks.
- 2. Where there are two paddocks of about the same size, carrying about the same number of sheep, run all the sheep in one paddock for three or four weeks, then move them all to the other paddock which has been spelled meanwhile.
- 3. This can be repeated—it can become the usual method of stocking.

#### General.

To avoid infection with all worms parasites:—

1. Avoid overstocking.

2. Practice rotational grazing wherever possible, and particularly in the case of weaners and breeding ewes.

3. Drench ewes before lambing, and young sheep whenever conditions as outlined above are likely to expose them to-risk of infection.

4. Find out which kinds of worms are responsible for trouble and use the appropriate drench.

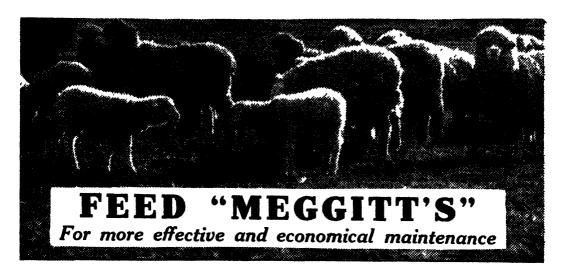
5. Your Stock Inspector or District Veterinary Officer will help you.

# Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

	1942.		1942.
Peak Hill (L. H. Roache)	July 28, 29,	Tullamore (W. J. Colville)	Aug. 19.
Condobolin (N. J. Hanlen)	Aug. 4. 5.	Parkes (L. S. Seaborn)	24, 25, 26,
Bogan Gate (J. T. aBeckett)	. 8.	Forbes (W. D. Roberts)	
Trundle (W. A. Long)			• '

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# "MEGGITT'S" is highly nutritious and a laxative!

Meggitt's Linseed Sheep Muts are highly nutritious and (because of their linseed oil and vegetable mucilage content) a very valuable laxative. Being rich in digestible protein, they correct deficiencies of this essential nutrient in roughages, such as dried-off pastures, scrub, etc. They also prevent dry, fibrous feeds from causing digestive troubles, such as impaction, which during drought periods are a common cause of mortalities, particularly in young stock and in lambing ewes.

Because of these qualities a small quantity of "Meggitt's" ied as a supplement to dry feed makes a very big difference to the health and condition of sheep. They are enabled to make much better use of the natural feed than would otherwise be possible, and they are therefore maintained in healthier and stronger condition. The protein rich, conditioning, and laxative qualities of "Meggitt's" are particularly valuable in the feeding of ewes with lamb at foot, to stimulate their milk flow and so enable them to rear their lambs. As a supplement to

dry feed, "Meggitt's" is regarded as being the best of all milk-producing concentrates.

When there is dry feed, 4-oss. of "Meggitt's" per ewe per day is adequate to ensure an ample supply of milk. For dry sheep a lighter ration is adequate under the same conditions.

# MEGGITT'S LINSEED OIL MEAL FOR TROUGH FEEDING.

Graziers who are trough feeding should use Meggitt's Linseed Oil Meal in their mixtures. The meal has exactly the same composition and feeding value as the nuts and will give equally as satisfactory and economical results.

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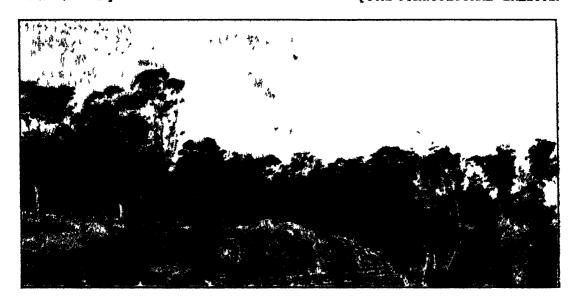
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# The Wianamatta Shale Waters Of the Sydney District.

Their Salinity and a Suggested Geological Explanation.

A N OLD, B St Agr, Analyst

THE salt content of underground waters from the Wianamatta shale area is shown to be so high that the waters are of limited use for stock and, except around the outer margins

of the area, quite useless for irrigation purposes.

The number of saline waters submitted by farmers to this Department from districts surrounding Sydney led the writer to examine all Departmental records of water analyses carried out since 1894. The information thus gained, supported by the collection and study of additional material, led to the discovery of the correlation between the salinity of the waters and the occurrence of Wianamatta shales. The data are embodied in a map reproduced herein indicating the areas in which waters of different degrees of salinity are to be expected. This should prove valuable to pastoralists and agriculturalists, enabling them to avoid further unnecessary expense in boring and well sinking in unsuitable localities.

## Salinity Standards.\*

The results of analyses quoted are expressed in terms of grains per Imperial gallon (70,000 grains = 1 gallon) As a standard of com-parison, sea water at Sydney contains 2,463 grains per gallon of total dissolved solids. With regard to the utilisation of saline waters for stock and irrigation, the experience of the Chemists' Branch has been that sheep will thrive on water containing up to 1,000 gpg. of total solids and have been known in some cases to drink even higher concentrations without harmful effect. Cattle are less tolerant of salt and the limit in their case is about 800 gpg Horses are fairly sus-ceptible to salt and when working should not drink water with more than 500 gpg. of dis-

solved salts, though they may be sustained on waters of somewhat higher salinity if they are not worked

In the case of garden and irrigation waters, only very arbitrary figures for the permissible limit of salinity can be given, due to such variable factors as the texture and organic matter content of the soil, the type of crop to be watered, the rate of evaporation, the rainfall and the chemical nature of the dissolved salts. However, the amount of salt allowable in water intended for use on plants is very much less than for stock use. An approximate limiting figure of 80 grains per gallon of total solids is suggested, where the bulk of the salt consists of sodium chloride (common salt). More than 10 gpg. of sodium carbonate is considered definitely harmful

<sup>\*</sup> See also Agricultural Gasette, September, 1939, page 487. "Stock and Imagation Waters"

#### Some Very Saline Wianamatta Waters.

Bearing in mind the standards of salinity mentioned above, it will be seen from the following table how remarkably saline many of the Wianamatta waters can be. Although these samples have all originated from localities within a few miles of Sydney they are quite as heavily impregnated with salt as many of the worst artesian bore waters of western districts.

#### Salinity of Wianamatta Waters.

			Grains per Imperial gall		
Locality.		Туре.	Total Solids.	Sodium Chlorid (NaCl.)	
Toongabbie		Creek pool	3,336	1,555	2,564
Yagoona .	•••	Well 14 ft	2,216	954	1,571
Sefton Park	•••	N.R.*	2,190	603	994
Lakemba . Austral	•••	777-11 - 0 44	1,898	784 836	1,291
Blacktown	•••	N.R	1,733	683	1,126
Riverstone	•••	N.R	1,639	541	893
Villawood	•••	Bore 22 ft	1,624	786	1,296
Penrith	•••	Well	1,586	853	1,407
Bringelly	••	Well 20 ft,	1,579	791	1,305
Fairneld .	•••	Dam	1,517	717	1,182
Wentworthville Chullora .	•••	Bore 12 ft	1,422	634	1,045 807
Padstow	•••	Well 15 ft Well 25 ft	1,380	489 607	1,000
Narellan	••	Bore	1,323	514	847
Punchbowl	::	Well 15 ft	1,264		962
Narellan		Creek (Hole in)	1,230	584 626	1,033
Riverstone .		Well	1,233	613	1,011
Canley Valc		Bore 21 ft	1,215	576	949
Narellan		Bore roo ft	1,170	562	926
Bankstown Box Hill	•••	Bore 30 ft	1,164	580	957
AG 1 . C 1 1	•••	Well Well	1,155	573 561	945 925
Penrith		Well 16 ft	1,143 1,138	559	923
		Bore 20 ft	1,134	515	849
Beverly Hills Canley Vale		Well	1,103	620	1,023
Bringelly		Bore 140 ft	1,093	532	878
Bringelly		Bore	1,079	560	924
Pendle Hill		Well 39 ft	1,036	502	827
Toongabbie Schofields		Well 20 ft	1,029	462	762
Plumpton	•••	167-11	1,002 988	505 418	833 690
Bankstown		Spring	984	462	762
Glenfield	!	Well 18 ft	974	462	762
Blacktown		Bore 27 ft	966	424	698
Toongabbie		Well 12 ft	960	502	828
Camden		Spring	954	472	779
Rosehil . Toongabbie		Bore 70 ft	952	472	779
Riverstone	-1	Well	951	487	803 782
Pendle Hill		Well	922	474 438	723
Wentworthville		Well	921	408	673
Vineyard		N.R	906	485	799
Merrylands		Well 27 ft ]	896	404	666
Pendle Hill		Wei	862	434	716
Rooty Hill		Well 20 ft	858	407	672
Wallacia Widemere		Dam	825	36I	596
Menangle		Well 16 ft	821	374	617 666
Belmore .		Well	815	404	675
Miverstone		Well	806	378	624
	- 1	1		3	

\* N.R. = Not recorded.

Of 428 waters from Wianamatta shale areas submitted from 1804 to February, 1942, the above fifty-one represent those containing over 800 grains per gallon of total solids. All of these waters, it is to be remembered, were being used, or were intended for use, by the senders on their respective farms.

#### The Wianamatta Shales.

During the Triassic period, that is, after the Coal Age (Permian) and before the Jurassic period (Age of the Great Reptiles), sediments

were laid down in an immense lake essentially the same as that in which the Coal Measures had been deposited; in succession the Narrabeen, Hawkesbury and Wianamatta beds of the Sydney district were deposited to a maximum total thickness of about 3,000 feet. The Wianamatta series with which the present discussion is principally concerned is thus the youngest of the three divisions; it overlies the Hawkesbury sandstone over large areas, but is not as extensive as that formation.

The rocks consist of highly aluminous shales, which are often carbonaceous and ferruginous, passing up in some districts into calcareous sandstones. Thin bands of impure coal, impure limestone and ironstone occur. In spite of this variation the beds are usually referred to simply as the Wianamatta Shales. "Wianamatta" was the original name for South Creek, one of the principal streams draining the area, and was applied to the shales by Australia's pioneer geologist, W. B. Clarke.

The principal area of Wianamatta shale extends westward from Sydney to Penrith and from north of Windsor to beyond Picton in the south. It attains a maximum thickness of about 800 feet in the Picton-Camden district.

Because the rocks of the Sydney district have been folded into an immense basin, or geosyncline, and the Wianamatta shales are at the centre of the basin, they outcrop generally speaking at a lower geographic level than the Hawkesbury sandstone and older rocks which form the high ground to the north, south and west of the shales. Thus the Wianamatta shales, which are the youngest and therefore the topmost rock geologically, occupy the low-lying country. The older rocks obscured beneath the shales at the centre of the basin incline upwards away from the centre until they outcrop at the surface around the edge of the shale and, still rising, finally reach a height of about 4,000 feet in the Blue Mountains. These relationships of the shale area are clearly shown on the large geological relief map of the State in the Mineral Gallery of the Australian Museum.

# Geologic Time Scale Showing Age of the Wianamatta Series.

Post Tertiary	٠	Recent			
•		Pleistocene			old.
Cainozoic or		Pliocene	•••	7 million yrs	. old
Tertiary.		Mincene		1 1911	
		Oligocene		J	
		Eocene		1 77 1111	. old.
Mesozoic		Cretaceous		125 million yrs	
		Turassic		ver million we	
		Wianai			
		Triassic   Hawke	sbury }	200 million yrs	, old.
Palaeozoic	-	Dommilan		240 million vrs	old.
		C1			
		December	•• •••	1	
	- 1	C11		1911	
	- 1	()-dead-la-	•• •••	1	
	ļ	Combulan		1	
Proterozoic		Late Pre-Cambria		700 million yrs	
Archaeozoic		Barly Pre-Cambri		1600 million vrs	

#### Shale Area Well Populated.

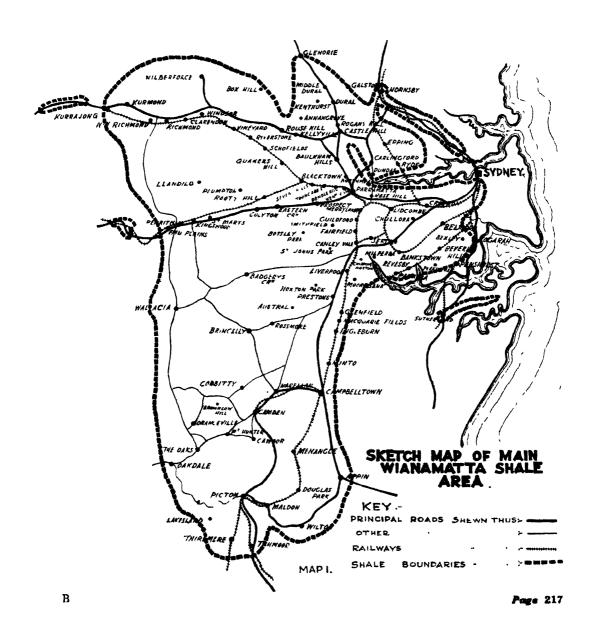
Compared with the size of the State of New South Wales the area occupied by the Wianamatta shales, perhaps 1,000 square miles, would

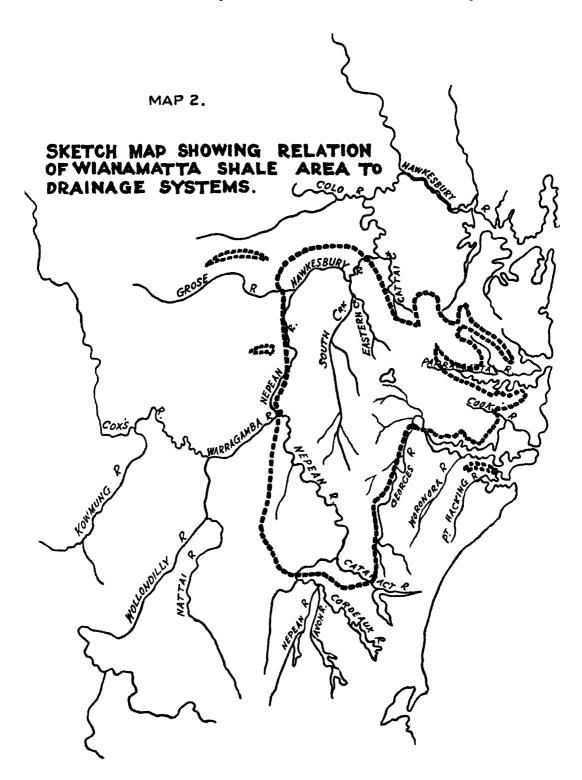
appear at first sight insignificant, but their geographical position at the immediate background to the capital makes them of paramount importance. It is on the shales (and alluvial deposits) that almost all the larger centres of population in the vicinity of Sydney, such as Liverpool, Campbelltown, Camden, Picton, Richmond, Windsor, Parramatta, and Penrith, have grown up. The Hawkesbury sandstone country, except for tourist centres on the western railway line, is, comparatively speaking, uninhabited.

The Wianamatta soils are of mediocre quality

The Wianamatta soils are of mediocre quality only, but they stand in marked contrast to the barren and largely virgin Hawkesbury sandstone country which occurs beyond the limits of the shale. These sandstones bear an important rela-

tion to the water supply of Sydney. The catchment area of the dams on the Nepean and its tributaries is uninhabited forest country almost entirely of Hawkesbury sandstone and only 40 miles from Sydney, a short distance compared with that from which many large cities of other countries bring their water. The fact that this sandstone consists of little other than sand grains, together with the low hydrographic relief, assures the purity of the water supply from this catchment area. The position is, of course, modified by the present use of water pumped from the Warragamba, which has a large inhabited catchment. It will be noted that the water supply is almost nowhere in contact with Wianamatta shale country.





#### Drainage of Wienamatta Shale Area.

Rain falling on the Wianamatta shale area drains to the Pacific Ocean through four channels:—

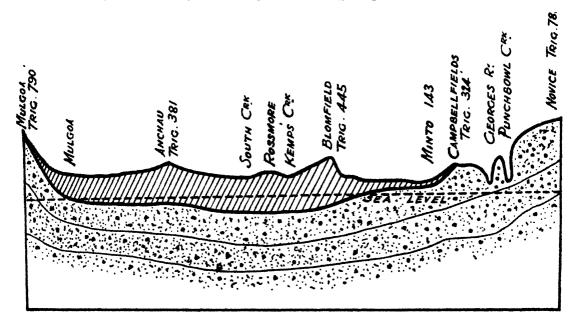
- (1) The Nepean-Hawkesbury River.
- (2) Parramatta River. (3) Cook's River.
- (4) George's River.

The first is by far the most important. South Creek, into which also flow Eastern Creek, Rope's Creek, Kemp's Creek, Badgery's Creek and Cosgrove Creek, drains a large area and joins the Nepean at Windsor. Other tributaries of the Nepean draining shale country are Bringelly

School Creek and Cabramatta Creek. The lower reaches of the four rivers and some of the creeks are, of course, tidal, a fact which must be borne in mind in investigating their salinity status.

#### Causes of the Salinity: "Fossil" Ocean Salt.

The suggestion is made that the salt content of the shales is essentially of connate origin; that is, it represents salt seawater entrapped in the sediments during the period of their accumulation. The fossils found in the Wianamatta shales are chiefly of freshwater rather than marine origin, but marine foraminifera occur in the higher beds. Quoting Sir Edgeworth David, "evidently



# GEOLOGICAL SECTION SHOWING RELATION OF WIANAMATTA SHALE AND HAWKESBURY SANDSTONE.

NOTE :

BASE OF SHALE BELOW SEA LEVEL.

WIANAMATTA SHALE

Creek, Cobbity Creek, Narellan Creek, and Mount Hunter Rivulet. (Cattai Creek drains Hawkesbury sandstone country for the most part.) The Nepean-Hawkesbury flows north before turning east to the ocean. Separating it from the other three smaller rivers flowing in a general easterly direction is a low watershed running in a north-west-south-east direction.

Parramatta River receives water from Toongabbie Creek, Duck River, and Duck Creek, while important tributaries of George's River draining shale country are Prospect Creek, Orphan HAWKESBURY SANDSTONE

the sea broke in occasionally in the later phases of this lake or was so close that its foraminifera were blown from its shores over the whole area of the lake." A late breaking in of the sea would account for the presence of a large amount of salt in rocks containing mainly freshwater fossils.

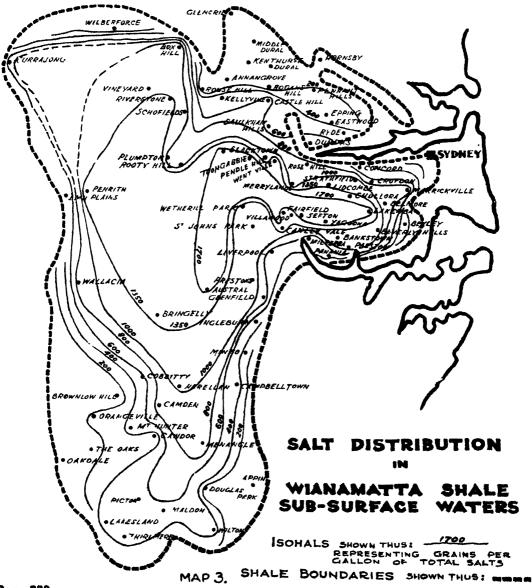
Normally, when sediments are raised above water level as solid rocks, the salts which they contain are to a large extent removed by rain water; in the case of the Wianamatta shales, special conditions have minimised this tendency

so that, after 200 million years, if the writer's view is the correct one, much of the original salt and perhaps even some of the original water remains. The shales might be said to contain portion of a "fossil" ocean.

As already explained the shales for the most part occupy low-lying country compared with the surrounding sandstone. Furthermore, the base of the shales over most of their area is below sea level and in places more than 100 feet below, as shown in the accompanying geological section. Natural drainage can obviously have no effect on the portion below sea-level. The low watershed dividing the Nepean Hawkesbury from the George's River and the smaller one between the George's and Parramatta rivers correspond roughly with the areas where the shale base is

farthest below sea level, so that a thick backbone or axis of badly drained rock results. The drainage of almost the whole shale area is by slow-flowing streams, and over large areas swamp-like conditions with a characteristic vegetation occur. A further factor assisting the retention of salt in the shales is their very heavy clayey texture. When wet, they become sticky, and almost impersious.

The connate or "fossil' nature of the salts is indicated by the fact that the amount of salt appears too great to be explained on any other theory, that a particular set of conditions favouring the retention of salt is operating and that the waters, like seawater, contain considerable amounts of magnesium as well as sodium salts.



Page 220

#### Isohala

In studying the lateral distribution of the salt in the shales, from analyses of bore and well waters, it has been found possible to draw lines on the map, representing the maximum expectancy of salt content in different areas (Map 3). Outside any such line, for which the term isohal is proposed (Gr. isos, equal; hals. salt), bore or well sinkers can be reasonably sure that if water is obtained it will have a salinity not greater than indicated by that particular line. Exceptions are not likely to be numerous, as the lines are based on data extending over forty-eight years.

The isohals show that the salt content of underground waters of the shales is greatest towards the central axis where the shales extend farthest below sea level, while their top surface forms a low watershed. The area of shale below sea level corresponds almost exactly with the 800 grains-per gallon isohal. The bulging of the 400 g.p.g. isohal to include the large mass of rock represented by the Razorback Range in the Picton district is worthy of note. The lowest amounts of salt are around the up-folded margins of the shale area where drainage has been most complete.

Practical Value.

Pastoralists and agriculturalists intending to bore or sink wells for water, bearing in mind the salinity standards given, and knowing the pur pose for which they require water, can by an inspection of the isohal map make a reasonable close prediction of their chances of success with regard to suitability, provided that water is They may also avoid unnecessary expense; thousands of pounds have been wasted in the past in expensive boring operations in areas where, it is now shown, there was little chance of obtaining water of the desired quality. It may be taken as almost certain that boring for water for irrigation, gardens, orchards, etc., is useless except around the outer margins of the shale outside the 200 g.p.g. isohal. Waters from localities outside the 1000 isohal are practically certain to be suitable for sheep, while those within it may not be. Suitability for cattle is to be expected outside the 800 g p.g. isohal and for horses, outside the 600. It is to be noted that the lines are based on the likely maxima and therefore err on the side of safety. Particular attention is drawn also

to the fact that the above remarks apply to shale and not to overlying alluvial deposits, which in some localities are quite extensive (Penrith, Richmond, Windsor, Liverpool, Canley Vale), and which usually provide better quality waters. Although it is in the bores and wells that the

Although it is in the bores and wells that the salinity of the shale waters is most pronounced, spring, dam and creek waters also contain more salt than corresponding types from non-shale country. In general, spring waters are more saline than dams and tanks, with creek waters the least saline, the salinity being governed by the degree of contact with the shale. Waters of the larger creeks average about 40 grains per gallon of total salts, but frequently evaporation of isolated pools or the flow of a spring into a creek increases the salt content to a very high figure.

#### References and Acknowledgments.

A search of the literature has revealed two interesting references to the subject. W. B. Clarke ("On the Causes and Phenomena of Earthquakes"; Trans. Roy. Soc.A.S.W., 1868, page 51) says

"Respecting the shock of 1800 felt at Prospect, Mr Lawson remarked to me that it changed the well waters from fresh to salt. This may merely refer to a local circumstance, the whole of the soil in the formation on which his house stood being naturally saline and the effect of draining off the fresh water might be to allow the saline springs to operate."

Professor Smith, M.D. ("On the Results of the Chemical Examination of Water for the Sydney Water Commission": Trans.Roy.Soc. N.S.W., 1809, page 146), giving analyses of many creek and river waters, says:—

"The water derived from districts covered with the shales and clays grouped by the Rev. W. B Clarke under the name of Wianamatta deposits is very different in character from sandstone water"

In the present study full use has been made of the records of the Chemist's Branch daring from 1804, and acknowledgment is made to the many analysts past and present whose work is represented therein.

Miss Shannon, Marketing Branch, has kindly redrawn the maps and section for publication.

# A Ready Market for Wild Castor Beans.

HUNDRIDS of tons of beans of the wild castor plant are required, as it seems certain that difficulty will be experienced in obtaining the usual supplies of castor oil from overseas. A good, clean, dry sample of castor seed is worth £25 a ton Samples for valuation should be sent to the Marrickville Margarine Pty. Ltd., Box 4, P.O., Marrickville, which has offered to purchase all beans available.

The method of harvesting recommended is to cut the spikes from the plants when the capsules have turned brown and are just commencing to split open; they are then spread thinly to dry out in the sun where they can be protected from rain. Within a week, under favourable conditions, the capsules should open and shed their seed. The

seeds are separated from the husks by winnowing, or perhaps by hand it small quantities only are being treated. It is very important that the seeds be thoroughly dry and free from injury when bagged.

The castor plant is easily identified by its large fan- or star-shaped leaves, and should not be confused with the false castor or thorn-apple, which has simple leaves with only one mid-rih. The capsules of the castor plant contain only one or two large bean-like seeds, usually speckled in shades of brown; thorn-apple capsules contain numerous small angular black seeds. The castor plant grows into a large bush or small tree, and lives several years, while thorn-apple is a smaller plant and is strictly annual,

# BLACKSMITHING ON THE FARM.

# With Hints on Welding and Tempering.

(Continued from page 166.)

# Welding.

L. J. KEMP, Overseer of Blacksmithing, Parramatta Gaol.

THE preparation of materials to be welded has been given prominence, and fully illustrated, in this article. This aspect is very important, as preparation is really the foundation of a dependable job. The different varieties of welds shown illustrate basic principles, and it will be obvious to the farmer that the type of job he is called upon to perform can be an adaptation of at least one of the principles illustrated. Every effort has been made to avoid the use of technical terms that would confuse the learner.

### How to Weld.

Under heat treatment, iron will change colour, varying from a dull red to a white hot, melting point. When the melting point is attained the irons will throw off a series of small bright sparks. This can be taken by the "operator" as a signal that the iron is about ready for welding.



Fig. 17.-Pieces of Flat Iron to be Welded.



Fig. 18 .- The Pieces Prepared by Chamfering.



Fig. 19.—The Lap Given. Indicated by dotted line.



Fig. 20 .- Irons in Position Ready for Welding.

To weld, place the two irons in the fire and heat until the required heat is attained, then hammer together on the anvil. Perhaps it will be found that one iron will heat much faster than the other, but this difficulty can be overcome by retarding the forward piece; either withdraw temporarily or dip in very fine sand. After a little experience no difficulty will be found in obtaining a welding heat.

Should the irons fail to stick together when a weld is attempted, this would indicate that insufficient heating has taken place, or perhaps that the heating of the two pieces has not been uniform. If, after welding, it is noticed that cracks appear or that the material has crumbled, this can be attributed



Fig. 21.-Pieces of Different Sizes to be Welded.

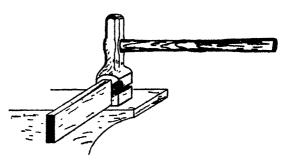


Fig. 22.—Drawing Down the Larger Piece.



Fig. 23.—After Drawing Down.
Dotted line shows original size.

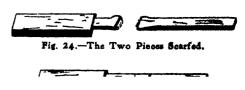


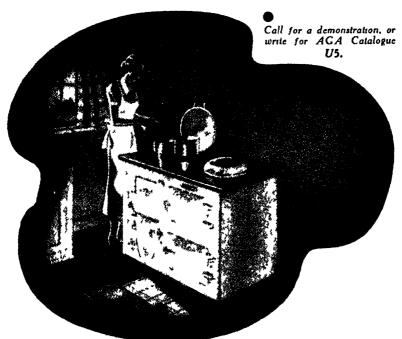
Fig. 25.-The Weld Completed

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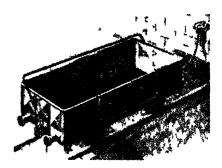
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LOAD AND UNLOAD TRUCKS PROMPTLY.

S. R. NICHOLAS, Acting Secretary for Railways. to the obvious mistake of over-heating. Perhaps the greatest difficulty amateurs will have is to overcome the tendency to over-heat or burn the material. Very often it is found that the use of a little slack lime mixed with the sand is very good when welding hard materials, such as mild steel.

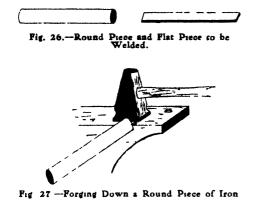


Fig. 28 -The Weld Completed

prepared by chamfering or scarfing; this is done with the fuller (Fig. 7). Actually this means that both pieces have been forged down to a wedge shape. The dotted line in Fig. 19 illustrates the length of lap which is given when the irons are placed together. Fig. 20 shows the irons placed one on top of the other and now ready to be welded. Round and square iron are prepared for welding in the same manner as flat iron.

A further example of welding two pieces of iron is shown in Figs. 21 to 25. In this instance a larger piece is to be welded to another of smaller dimensions. Swage (or draw down) the larger piece to about the size of the smaller piece before attempting to weld together. Fig. 22 shows the method of drawing down the larger piece; this is done with the top and bottom swages. Fig. 23 illustrates the larger piece after forging down, the dotted line showing the original size of piece. Fig. 24 shows the two pieces after having been scarfed, and Fig. 25 the two pieces placed together as in a welded joint.

Yet another example of the preparation of materials before welding, is illustrated

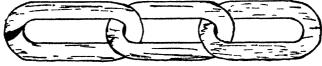


Fig. 29 -A New Link in a Chain Ready for Welding

A welded section is never as strong as the original bar. It would be a very good weld that would represent 95 per cent. During the heating of irons a deterioration in size of pieces takes place. It is found necessary in particular work to upset or thicken up the irons before welding. A weld should be well hammered together, as this imparts toughness to the material. Always weld with haste, as metals coming into contact with the cold air, cool off very quickly; fumbling and hesitancy can be overcome with experience. Do not attempt to weld with a clinkered fire; always make sure that the forge fire is well alight and glowing, and that the materials have been prepared in the proper manner.



Fig. 30.—A Piece of Round Iron for Link Making.



Fig 31 The Ends Scarfed.



Fig 32 - The Lar. Indicated by dotted line



Fig. 33, -The Link Bent.

#### Preparation of Material.

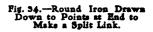
The illustration, Fig. 17, shows two pieces of flat iron which are to be welded. Fig 18 shows the irons after they have been

in Figs. 26 to 28, which show the method of welding a round piece of iron to a smaller sized flat bar of iron. Fig. 26 shows the pieces to be welded, and Fig. 27 the way to forge or shoulder down to the required piece. It will be noticed that the flatter is used for this class of forging. Fig. 28 represents the two pieces placed together as in a welded length. In almost every instance it is advisable to forge down all materials to approximately the same size before a weld is attempted.

### Welding Chain Links.

Welding a new link in a chain that is broken is not difficult if done in the manner construction, would be useful to learners who would find it difficult to weld links in a chain. To make a split link cut off the round iron to length required and draw down or point the ends as shown in Fig. 34. Bend the ends as shown in Fig. 35; the length of the bent portion should be about half that of the link required. Fig. 36 shows the finished link ready for use.

In selecting the iron to forge a split link always use material that is of a size larger than that of the broken link that has to be replaced. The following rule should be sufficient for general use: Broken links in 1-inch diameter chain should be repaired with



as illustrated in Figs. 29 to 33. Cut off a piece of round iron to length required (Fig. 30), and scarf the pieces as in Fig. 31. Fig. 32 shows the scarfed length, the dotted line indicating the lap required. Bend the link as in Fig. 33; the links are then hooked together and are ready for welding as shown in Fig. 29.

It will be noticed that chains become brittle in cold weather and very frequent repairs are necessary. This difficulty can be overcome by the process of annealing. To anneal, place the chains in the fire and heat all the links and hooks to a dull red colour. Take them out and allow to cool out gradually. Frequent annealing will give the chains a much longer life.

#### Split Links.

Split links are very often used for repairing chains, and, on account of their simple

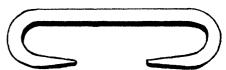


Fig. 35 .- The Ends Bent.



Fig. 36.-The Link Completed.

split links 5/16th-inch diameter. Links of 5/16th inch diameter require links of 3/6-inch diameter (or thickness) and so on. A split link is not as strong as a good welded link, but is a very fair substitute and is generally used in cases of emergency.

(To be continued.)

THE Chief of the Division of Animal Industry points out that attempts are still being made to make unauthorised introductions of birds and animals into this country from abroad, despite the warnings that have been issued as to the dangers of introducing diseases, not only of animals but of humans, in this way.

Those responsible for such practices may not realise the harm they might do. They may not know, for instance, that rabies and hydrophobia (canine madness) are the same thing; and that there is an ever-present grave danger that rabies might be introduced into Australia by a dog that appears to be perfectly healthy. The incubation

period of rabies might be six months, so that an affected but healthy looking dog might not become dangerous for months after its introduction.

Australian children have been spared the horror of the fear of rabies. Let us try and keep this country free—even at the expense of a few pets.

Anyone knowing of the illegal introduction of birds or animals should advise the quarantine authority—the Department of Agriculture, Box 36A, G.P.O., Sydney—and persons writing overseas to soldiers and others who might bring animals to Australia, could mention the dangers of disease introduction in their letters.

# PARAGRAPHS AND NOTICES.

# Superphosphate for Wheat.

# Use it to Best Advantage.

METHODS of utilising to best advantage the restricted quantities of superphosphate available for this season's wheat sowings are indicated by a survey of manurial trials conducted by the Department of Agriculture at its experiment farms over many years.

The methods indicated are:-

- (1) Use a reduced quantity of superphosphate, say 42 lb. per acre, over the whole fallow area, rather than the normal amount over portion of it.
- (2) Use any balance available upon stubble areas sown, at not less than 28 lb. per acre or as low as the drill will sow if that amount is greater.

Yields at Temora Experiment Farm, where from 1928 to 1940 an application of 56 lb superphosphate increased the average yield of wheat sown, in season, on fallowed land by seven bushels per acre, showed further increases of only I bushel and 8 bushel respectively from applications of 84 lb. and 112 lb. per acre Comparable differences in yield were obtained over long periods at Wagga, Cowra, Condobolin and Trangie Experiment Farms.

If the amount of fertiliser available is insufficient to apply 56 lb. of superphosphate, then the best course is to use 42 lb. or such lower poundage as will allow all fallow land to be fertilised.

Similar results have been obtained with hay crops. Yields at Wagga for nineteen years showed

an average increase of 12 cwt. per acre from an application of 56 lb. superphosphate and additional yields of only 5½ cwt. and 3 cwt. respectively from 84 lb. to 112 lb. applications.

#### Stubble Sowings.

Fertiliser trials on stubble over a number of years show that such land does not respond to superphosphate as well as fallow, so that the fertiliser should not be used on stubble until the requirements for all the fallow land at, say, 42 lb. per acre have been met. Any fertiliser then available should be used at, say, 28 lb. per acre. It would be better to allow a portion of the stubble to remain unfertilised than to reduce the amount below 28 lb.

#### Residual Effect of No Value.

Farmers who may intend relying on the residual effect of superphosphate applications in past years, will be interested to know that an experiment carried out at Wagga Experiment Farm some years ago indicated that this residual effect is not sufficient to be of value during this period of shortage. Whereas the average increase over eight years from direct application of 56 lb. superphosphate was 77 bushels per acre over the no manure plot, the increase when wheat was sown unfertilised on the land which previously received 56 lb. superphosphate, was only 4 bushels per acre—11. BARTLETT, Special Agricultural Instructor.

# Johnson Grass Not Favoured.

# Many Better Grasses Available.

JOHNSON grass (Sorghum halipense) is a plant that we would be better without, is the opinion expressed by Mr. J. N. Whittet, Chief Agrostologist of the Department of Agriculture, in reply to inquiries as to whether this species has any place in the Australian pasture improvement programme.

With the exception of a few examples where this species has been grown under irrigation (in two low rainfall zones in inland districts), most other instances of the sowing or natural occurrence of Johnson grass have been attended by detrimental results, chiefly in the nature of cattle polsoning and difficulty in eradicating the grass

from cultivation areas. In the case of the irrigated blocks of Johnson grass mentioned above it is stated by the owners of the properties that no stock losses have been recorded thereon. However, in view of the fact that this grass is a free seeder and has underground stems, it constitutes a menace to adjoining irrigation country, as the seed can be carried by water and the underground stems of the plants will infest irrigation channel banks. As we have a wide range of both summer and winter growing grasses and clovers of high carrying capacity to select from for irrigated pastures, these can with advantage be used instead of Johnson grass, which does not provide any feed in the winter time, as it is cut back by frosts.

Cases of poisoning have occurred in New South Wales among cattle grazing on Johnson grass. The fact that this is a potential poison plant places it high in the list of our detrimental species. One of the most recent major fatalities from stock grazing on this grass occurred in the Gilmore district, eleven out of forty-five valuable dairy cows being poisoned. Cattle losses have also been reported from the Albury, Armidale, Inverell, Wellington and Windsor districts.

Johnson grass belongs to the sorghum family of plants, many of which, in their early stages of growth, contain compounds which yield prussic

acid.

As a weed of cultivation this species is one of the most difficult to eradicate completely unless great care is taken to dig out all of the underground stems. This grass reproduces from seed

as well as from below-ground parts.

In the United States of America certain grassland workers, while admitting that the grass may cause poisoning in stock, claim that Johnson grass has some utility as a pasture plant. Where this species will thrive in Australia we can grow pasture plants which are just as productive and are without any detrimental features.

Australian seed and grassland specialists' opinions of Johnson grass, concluded Mr. Whittet, can be summed up in the recommendation unanimously carried last year at the Melbourne conference of Commonwealth and State officers in charge of seed testing legislation. "That Johnson grass be included in the list of seeds prohibited from sale in Australia."

# Causes of Poor Germination in Ball Clover Seed.

AMY MYERS, Seeds Officer.

THAT heavy scarification of the seed of Ball clover-which is being used increasingly for pasture and soil improvement—is necessary to ensure penetration of sufficient moisture for germination, and that an "after ripening" period following harvest is necessary before maximum germination occurs, were demonstrated in laboratory trials recently carried out by the Department. These facts explain the disappointing results sometimes experienced following sowings of new seed of this clover.

Two samples of seed were received from Vic-

toria in 1040.

The first had been harvested in rye grass and was still in the husk when the rye grass was cleaned. One portion was licavily scarified and the other lightly treated. The machine used for the treatment of each sample was an Eddy "mant Huller and Scariher." of which the following description is taken from a pamphlet published by the American manufacturer - "By centrifugal action, the seed is thrown against the upper parts of special hulling and scarifying emery rings, thus receiving a glancing blow against the abrasive surface. This action is repeated four times so that the abrasive action does not need to be severe at each step and a comparatively low seed velocity will give the desired action.

Tests were made on receipt of the sample which was then some ix months old; then three months

later, and again twelve months later

The results were: -GIRMINATION August. December, November, 1940. 1910 1941. per cent. per cent. per cent. Heavily Scarified ... 59.5 51 99.5 Lightly scarified ... 55.5 3 4.5

In the heavily scarified sample, since al! the seeds swelled with the absorption of water within twenty-four hours of the beginning of each test, the remarkable increase in germination at November, 1941, was due, not to treatment alone, but also to the seeds having passed through the dormancy period.

In the lightly scarified seed the breaking of the dormancy period had no effect on germination. because the treatment was so light that sufficient

moisture could not be absorbed.

The second sample had been cleaned from rye grass grown early in 1940. It was then recleaned and in November, 1040, was cleaned for the third time. The sample had therefore had some light scarification from these cleaning operations before being put through the Eddy machine

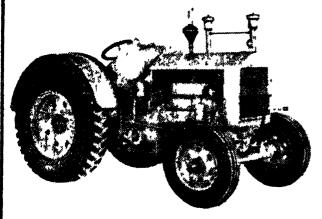
It was divided into two lots, and the germination results when the seed was eighteen or twenty months old, were as follows:

-			
	Germma- tion	Hard Seeds.	Swollen Seeds.
Heavily scarified Lightly scarified	 per cent. 79.5 41.5	per cent. 5 47	per cent.

The remaining few seeds in each sample were

The scarifying received during cleaning operations plus the age of the seed, explain the comparatively high germination of the lightly scari-fied sample and the low percentage of un-germinated seeds in both samples. Even then the germination of the lightly scarified sample was considerably lower than the heavily scarified one, and the number of hard seeds was 40 per cent.

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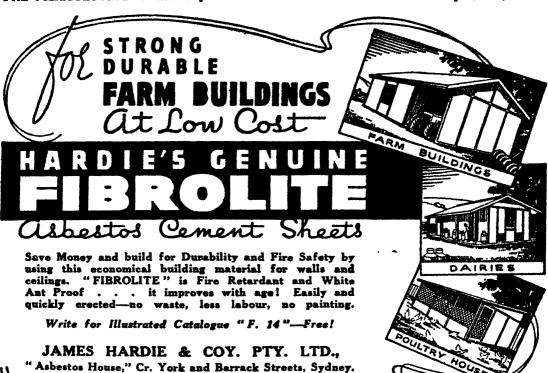
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# Approved Seed.

May, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twenty-five for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied

regarding it to inquirers.

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# Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:-

Bencubbin, Ford, Eureka, Eureka 2, Bordan, Waratah.

Oats-

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Tweed Wonder, Brown Beauty.

Sorghum— White African, Saccaline, Jones.

Japanese Millet-

Grasses, etc.

Phalaris tuberosa, Subterranean Clover (midseason), Sudan Grass, Lucerne.

Page 227

# FRUIT GROWING.

# WINTER PRUNING OF CANNING PEACHES

# On the Murrumbidgee Irrigation Area.

J A BALLANIYNE, Special Fruit Instructor, and C. J. HORIH, Fruit Instructor

AFTER more than twenty years of experience the pruning of canning peaches can be considered to be well out of the evolutionary stages, and definite systems have been evolved. It is the purpose of this article to describe the methods recommended and to indicate certain malpractices which, if continued, will have an ill effect upon the quantity and quality of future production.

There are still some, for instance, who believe that hard cutting in the young tree results in more vigorous growth and greater sturdness, and that early cropping has an injurious effect upon future production, whereas it is now known that continuous hard cutting actually retards growth, produces smaller trees and delays fruit production



Fig 1 -- A Strong Three-year-old Tree Before Pruning

Birdy, the system recommended is that the young trees should be headed back the first few years following planting, so that the desired subdivision of limbs may be effected and a suitable foundation for the tree may be built up. When this has been attained (usually in the third year) and provided the tree is making satisfactory growth, cutting or heading the leaders should be discontinued. It is at this stage especially that hard cutting or leaders is detrimental to the tree. Thinning out the latted growth to untipped leaders, or possibly reducing the leaders to lower untipped laterals, is the treatment advised when pruning the young, strong, well-limbed tree.

#### Handling the Young Tree.

When the young tree is removed from the nursery the top should be cut back to compensate for the reduction in the root system brought about by transplanting. During the first year's growth, careful thinning of the shoots will allow better development of those required for the formation of the head at the next winter pruning. It is difficult to handle more than three main arms. Should four be retained, two may be directly opposite each other and may, in later years, split the trunk under full load. Five arms are some times left but usually give an overcrowded crotch

It is necessary to shorten back these main aims after the first and second years' growth in order to obtain satisfactory subdivision and leaders, but any heading back after the third year should be done only to check excessive growth likely to sap and weaken the other limbs, and to increase the number of leaders or sub-leaders if required. Hard cutting back after this stage has been reached is undesirable in the vigorous



Fig. 2. The Same Tree After Pruning.

tree, it will ceitainly give strong growth at the point of cutting, but only at the expense of girth increase in the lower part of the limbs

Watch carefully the manner of growth in the south-western quarter of the tree—the "windy corner" It is difficult to get the tree growing into the wind, and the limbs on this side should be encouraged by thinning of unnecessary growths ind, if heading back is necessary, by cutting to a lateral headed in the right direction. Aim to give these limbs resiliency in the wind rather than rightly against it

Fig 1 shows a strong, three year-old tree before and Fig 2 the same tree after pruning. These lumbs have been thinned, but have not been topped. Note the points and angles of attachment at the subdivisions in the thinned tree.

A mistake sometimes made is that of low cut ting, instead of obtaining subdivision by means of well attached lateral growths the limbs are brought back to dominit buds at about the height



Fig 3 Die-back from Hard Cutting

subdivision is required. Often the upper buds fail to bicak and the first foot or so of the limb dies see Fig. 3. Sometimes the limb may be topped failly high with the result that vegetative growth takes place at the head of the limb and there is but slight increase in girth of the lower part, the limb then has a spindly appearance, and the tiec is narrow and too crowded for the development of many leaders. The wide open tree should certainly be avoided, as particularly liable to sunscald, but, increatibless some certain amount of spread must be obtained if sufficient leaders are to be encouraged.

I ig 6 is an example of poorly developed scaf fold limbs. This condition may result from the cutting out of leaders and laterals which should have been retained, or from the fact that the tree leaders were allowed to go unheaded too early in the life of the young tree. One means of increasing the fruiting surface of such a tree is by the encouragement of short secondary arms at intervals along the main arm or if the tree is on the

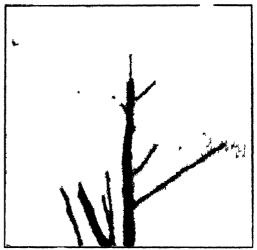


Fig 4 A Leader Cut Hard

weak side a reheading of it and subsequent in crease in leaders from the new growth resulting from this treatment

Fig 7 shows the other extreme, a crowded crotch Too many limbs have been allowed to grow from the crown and though some improvement can be gained by the removal of surplus arms it is doubtful whether such a tree could carry even a medium crop

The young tree just coming into production often presents a quandary. The growth of fruiting wood may be prolific with many strong wood shoots, and on this account there is a strong tendency to cut back hard to offset the vigorous growth. Topping the vigorous tree but results in similar growth to that shown in Fig. 5 and reference to Fig. 8 and 9 will show how best to treat such limbs. Details of the method of handling these leaders are shown in Fig. 10 and 11. The truiting wood needs taitly heavy thinning to pre-



Fig. 5 -The Growth Resulting from Hard Cutting, as in Fig. 4

# THE AGRICULTURAL GAZETTE.]





Fig. 8 .- Strong-growing Leaders Before Cutting.



Fig. 10.—Incorrect Method of Cutting a Lateral.

The sap conducting vessels are reduced and half
the lateral supporting fibres are cut away.



Fig. 7.-An Over-crowded Crotch.



Fig. 9.—The Limb Shown in Fig. 8, After Peuning.

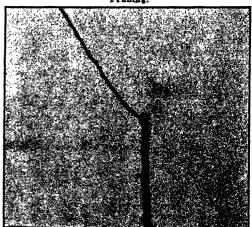


Fig. 11.-Lateral Correctly Cut.



Fig. 12.—Portion of a Limb of Pullars Before Pruning.

vent overloading of the top, and to permit spacing for fruit development and replacement of fruiting laterals. Heading to a strong uncut lateral will take care of further extension during the following season.

#### The Mature Tree.

As the tree ages, so the development of annual fruiting shoots from the lower main arms decreases, and replacement in this portion of the tree comes mainly from secondary laterals. This is, however, no deterrent to good production. Fig. 12 shows vigorous growth of one-year-old fruiting shoots. rising entirely from secondary laterals. Fig. 13 is the same limb after pruning. A considerable amount of the fruiting wood has been removed entirely, with both replacement for the following season and reduction of the crop in the current year in mind. Some spacing has been carried out and most of the laterals retained have been shortened. The objects of shortening the



Fig. 14.-Limb of Golden Queen, Before Pruning.

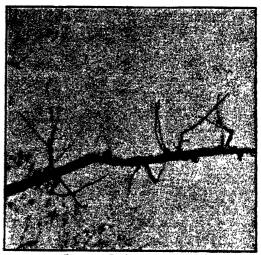


Fig. 13.-Pullars Limb Pruned.

fruiting lateral are, first, to reduce the crop to that which the shoot can safely carry, and next to promote development of new shoots closer to the main arm. Shortening of the longer laterals also reduces the amount of movement in the wind and the possibility of blemish from that cause.

#### Variation in Treatment of Varieties.

The same general principles hold for all varieties of canning peaches, but varietal characters in regard to type of fruiting shoot and disposition of fruit buds, call for some variation in the length and number of shoots retained. Considerable information has been obtained regarding the field behaviour of the many varieties once planted. Mention is made of most of these varieties here, but, as the earlier maturing varieties have not proved as profitable as the midseason and late, their planting has not been very extensive in recent years. Plantings of the midseason Phillips



Fig. 15.—The Limb Shown in Fig. 14. After Pruning.



Fig 16 Twenty-year-old Golden Queen

and Golden Queen and the later Pullars Cling have been fairly extensive. Planting of satisfactory carlier varieties is to be encouraged and it is to be regretted that while Paloro (Selma). Peak, Levis and others have canning quality they have vet been so unsatisfactory in the field. Other early peaches are being developed but cannot be recommended without further field trial.

#### Pullars.

This hardy variety generally provides a plentiful supply of fruiting laterals, well furnished with fruit buds. Figs 12 and 13 show portion of a Pullar limb before and after pruning. Shortening of laterals in accordance with the strength of the shoot is advisable, tipping is not sufficient, as the new shoots arise near the end and the truit is



Fig. 18.—Limb of Phillips Showing Several Types of Leterals.



Fig 17 Vigorous Development of Fruiting Laterals on Twenty-year-old Golden Queen.

more liable to blemish if not lost from breakage. Uncut lateral pruning has been tried with this variety, but is not to be recommended.

#### Golden Queen.

Young trees of this vinety produce good quality fruit. The laterals though perhaps not quite as strong as in Pullar, may nevertheless, be pruned in much the same manner. Particular care should be taken in regard to spacing of the fruiting laterals along the secondary arm.

In older trees, though production of fruiting literals is prolific, more thinning of these may be required, for as the trees age there is a tendency to produce small fruit. A lot however, depends on the vigour of the tree and the conditions under which it is growing.



Fig. 19.—The Limb of Phillips, After Pruning, Note the untipped smaller laterals, also shortening of the stronger lateral growth.

Figs 14 and 15 were taken on the orchard of Mr J F Baulch Leeton and show his system of handling this variety, on trecs which are nearly twenty years old. Observe the proline development of new wood drastic cutting of this kind should not be carried out on less vigorous trees, rather would it be better to allow a little more length to the shoots and practise heavier thinning of literals.



Fig 20 - Limb of Goodman's Choice Before Pruning

#### Phillips Cling

Though re of the mun nudscason peaches Phillips Cling is not so widely planted as those previously mentioned. Cert in varietal characters make it necessary to give particular treatment to fruiting wood in order to obtain good crops and to prevent alternate cropping. Vigour in the tree is to be desired, but not vigorous production of the strong fruiting lateral. I just 18 and 19 show different fruiting laterals from Phillips and their treatment. It will be noticed that in nearly all laterals the production of fruit buds is well to wards the coil of the shoot. Poor quality fruit would be obtained if all these shoots were left uncut. Such a length, on strong shoots, would mean more movement in the wind and would cause blemish and other mjury to the fruit

The pruning of these tip bearing laterals is really a compromise. As the shorter lateral is strong enough to carry fruit towards its end without danger of much wind movement, these shoots are cut hard back we force further strong shoots from the lower buds and are no better off the next season, so a moderate shortening is adopted as shown in the illustration (Fig. 19), leaving five to eight buds, according to the strength of the shoot. This practice results in the growth of shorter, tip-bearing laterals which may be left uncut at the next pruning, though some thinning of excess shoots may be advisable.

There is evidence of bud variation in Phillips, and in selection of wood for propagation it is at least advisable to take it from trees known to give the desired type of fruiting lateral

#### Goodman's Choice.

'I rees of this variety grow vigorously, and are turnished with fruiting laterals carrying plenty of fiuti buds. I hey have, however, a liabit of dropping fruit from an overcrowded lateral, and to effect this successful growers have adopted a very short style of stubbing back, leaving no more buds than the shoot is strong enough to carry Figs. 20 and 21 show the method adopted by Mr. Baulch of Lecton. Note the vigorous development of fruiting laterals and the amount of wood removed in pruning.

#### Sims.

This is one of the occasionally shy bearing vincties. Before pruning sims a very careful examination should be made of the fruiting laterals, short tip bearing shoots may be abundant some seasons, and there may be a number of well furnished ones, but in other seasons at may be necessary to leave rather more secondary laterals than would normally be the case. The tronger shoots are better treated as in Phillips and the shorter laterals left uncut

One danger in any variety of leaving the stronger laterals uncut is that renewal wood for the following season comes from the buds at the extremities. I hough short spur like shoots may grow closer in to the main arm those 'spursare very short lived in peaches and later in order to gain replacement of fruiting wood closer in the worn out lateral must be removed. This may result in loss of the lateral entirely as dormant buds soon lose their vigour in peaches. If the two or three year old lateral must be removed it is better to cut to the second or third bud than right at the main arm. Such stubbing is not the best practice where treedom from blemish is so important, but the stubs which fail to shoot should be removed, without fail, at the following pruning

#### Other Early Varieties

Levi Palito Peil ind other earlier varieties were not plinted in earlier years to any great



Fig. 21 -The Limb of Goodman's, Pruned.

extent, but a few more years of cropping may still be expected from the areas now in production, and a few remarks concerning treatment of lateral

shoots may be of value.

The stronger fruiting laterals in all these varieties need moderate shortening, depending on the relative strength and distribution of fruit buds. Levis is generally plentifully supplied with well budded laterals, and these may be thinned for the purpose of reducing the setting and to prevent blemish from overcrowding. This variety is very

# Phylloxera Resistant Rootlings For 1943 Planting.

GROWERS are requested to lodge their orders for Phylloxera resistant rootlings for 1943 planting season before 30th May, 1942.

This will greatly assist the Department of Agriculture, which, owing to the war position and the shortage of labour, desires to avoid as far as possible growing at Narara Nursery more rootlings than are required for next season's planting.

Orders should be forwarded to the Under Secretary and Director, Department of Agriculture, Box 36A, G.P.O, Sydney. liable to marking, and the pruning should be such as to reduce the liability to wind movement as much as possible.

Overcropping should be avoided, especially with Levis; it leads to alternate cropping and, in the off-year, the crop is often a total loss, as the few large fruit carried generally develop "internal browning," similar to that found at times in Pullars.

In Paloro (or Selma) it is essential that the laterals be shortened, otherwise there is poor replacement of the shorter ones.

It should be borne in mind, however, that it is seldom that pruning reduces the crop to just that which the tree can safely mature, and in almost every instance attention to the thinning of the crop during the growing season will be required.

#### Conclusion.

Pruning has a considerable influence on the development of both the tree and its root system. It is, nevertheless, but one item in orchard management. Irrigation, cover cropping, tillage, fertilizer practice, pest and disease control, should all be carried out with a view to maintaining vigour in the tree. Judicious pruning will then give that balance between vegetative growth and fruit production so necessary for the production of regular crops of good quality fruit.

# Dairy Science Schools, 1942.

# Applications Close on 31st May.

Persons wishing to attend Dairy Science Schools during the winter months should make written application, accompanied by a fee of 10s. 6d., to the Under-Secretary and Director, Department of Agriculture, Box 36A, G.P.O., Sydney.

It is proposed to arrange these Schools at country centres only where there is a guaranteed minimum of ten (10) candi-

dates for that particular School.

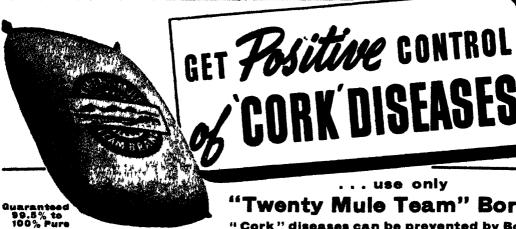
Candidates will be examined for Certificates, which are issued under the provisions of the Dairy Industry Act, 1915-40, for Milk and Cream Testing and Cream Grading.

Before a Cream Grading or Cream Testing Certificate will be issued, evidence of twelve months' experience in a Dairy Produce Factory (Butter) will be required.

Before a Certificate covering Milk Testing will be issued, evidence will be required to satisfy the Chief of the Division of Dairying that the candidate has had sufficient practical experience.

The closing date for the receipt of applications will be 31st May, 1942, and as soon as possible after that date intending candidates will be advised by the Department as to the centre at which they will be examined.





Technical Information and Quotations ob tainable from agents Potter & Birks Pty Ltd., Groevenor House, Sydney, NSW H M Russell & Co Pty Ltd. Eagle and Charlotte Sts., Brisbane W H MacLennan Pty Ltd., 499 Little Collins St., Melbourne, C1 Switt & Co Pty Ltd., 26 Clarence St., Sydney also at Melbourne, Perth, Adelaide, Brisbane, and Wellington, NZ

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# THE ENEMY LISTENS

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# MSECT PESTS.

Notes contributed by the Entomological branch.







# The Vegetable Weevil.

(Listroderes obliquus)

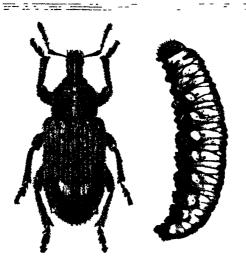
VEGETABLE growers are warned, that practically all winter vegetables may be attacked at this period of the year by the larvae or grubs of the vegetable weevil, and are reminded of the necessity of adopting control measures before serious damage has been caused to their crops. The weevils are particularly destructive to carrots, turnips, beetroot, lettuce and radishes, etc., but beans and peas are not infested. They also feed on a wide variety of weeds, and in particular, on Cape weed (Cryptostemma calendulaceum) and marsh mallow (Malva sp.).

The small, green or yellow eggs, which are laid on the soil near the base of the plant or in the crown, hatch in from two to four weeks. The small, stout-bodied grubs generally make their appearance about three or

four weeks after the first autumn rains. They are legless and measure about ½ inch in length when fully-fed, and vary in colour from light-green to yellow.

The grubs are to be found on the undersurfaces of the leaves or on the crowns of the plants. Large irregular holes may be caten in the leaves and the new leaf growth of the crowns may be eaten away as it develops. The larva is fully-fed in from four to six weeks, and it then enters the soil where it constructs a cell within which it enters its pupal or chrysalis stage. The grey-brown adults emerge from the soil about the end of Vugust and are most

numerous during October and November. Both larvæ and adults feed at night but the larvæ may also feed during the day.



Adult and Larva of the Vegetable Weevil.

#### Control.

Clean cultivation is an important factor in vegetable weevil control. All weed should be destroyed early in the winter as weed destruction late in the season will cause the weevils to migrate from the dying weeds, or from the soil, into cultivated areas.

With most crops, such as carrots, beetroot, turnips, etc., control of the larvae during winter, or the adults in the spring, may be obtained by spraying or dusting with lead arsenate.

The Spray.—

Lead arsenate powder ... 2 oz.

Water ... 4 gal.

The Dust.—

Lead arsenate powder ... 1 lb.

Kaolin or hydrated lime .. 4 lb.

Where the larvae are infesting crops such as lettuce, etc., which must not be contaminated with lead arsenate, a dust consisting of equal parts of pyrethrum and kaolin may be used.

Where the ground is known or suspected of being infested by this pest, all weed growth or crop remnants should be cleaned up and removed, and after an interval of several days the area should be baited. For this purpose, chopped leaves of lettuce, turnip, Cape weed or marsh mallow, which have

been either sprayed or dusted with lead arsenate should be scattered over the ground late in the afternoon.

A poison bran mash bait may be used instead of the poisoned foliage, the formula being as follows:—

Bran	24 lb.
Molasses	4 lb.
Sodium arsenite	1/2 lb.
Paris green	1 lb.

The sodium arsenite should be dissolved in the water the molasses then added and the mash prepared. Paris green should be mixed dry with the bran, and the mash prepared with water in which the molasses has been dissolved. The bait should be broadcast and partly worked into the soil in the late afternoon.

As the vegetable weevil does not attack peas, beans, pumpkins, squashes, etc., or oats, wheat and barley, these crops should be used in rotation to free the ground of weevil infestation.

# The Cabbage Moth.

(Plutella maculipennis.)

THE caterpillars or grubs of this moth are well-known to all growers of cabbages and cauliflowers. They may also cause serious damage to turnips, radishes, brussels sprouts, kohl-rabi, mustard, garden stocks, wallflowers, etc.

### Life History.

The minute, pale-green or yellowish, discshaped eggs are laid singly, usually on the under-surfaces of the leaves. The young grubs, for the first two or three days after hatching, eat small pieces from the leafsurfaces or else burrow into the leaves in a similar mamer to leaf-miners. They grow rapidly, become bright-green in colour and eat large holes in the leaves. The outer leaves become riddled, but as the plants become older the caterpillars mainly feed on the more tender centre leaves.

Where the infestation is severe and control measures have not been adopted, the centre leaves become covered with fine webbing, and the heart riddled with holes and fouled with excrement rendering it unfit for human consumption.

The caterpillar is very active and when disturbed wriggles quickly away, drops to the ground or hangs suspended by a silken strand beneath a leaf. The fully-fed grub spins a thin, lace-like cocoon, usually on the under-surface of one of the outer leaves, or amongst the heart leaves, and within this cocoon enters its pupal or chrysalis stage. The pupa is green at first, but becomes brown before the adult (moth) emerges.

The moth is very small, grey-brown in colour and when at rest with folded wings shows a row of angular, yellowish markings down the centre of its back. The time occupied in development, from egg to adult, varies from seventeen to forty-seven days.

#### Control.

Dust the plants every seven or ten days, in the seed-bed and after transplanting, with either lead arsenate or derris prepared as follows:—

(I)	Lead arsenate powder	- 8	lb.
	Kaolin	8	lb.
*(2)	Derris powder	2	1b.
	Kaolin	16	lb.

<sup>\*</sup> Derris and kaolin are now obtainable ready mixed.



Caterpillar or Grub of the Cabbage Moth.
(Enlarged)

In most areas the best results are obtained by dusting the plants with lead arsenate during their early growth, i.e., in the seed-bed and after transplanting, and with derris during the later stages when the plants are hearting.

Treatment with lead arsenate or other arsenicals must cease six weeks before cutting commences or when the centre leaves commence to fold over, owing to the danger of contaminating the heads.

#### Treat the Plants While Young.

The importance of treating the plants while they are young cannot be too strongly stressed. Early treatment is easy and inexpensive, while a belated effort to check infestation with arsenicals on well-grown plants is both costly and difficult, and is the main factor in causing excessive residues on the plants which render them liable to seizure and destruction, with consequent loss to the grower.

# Cabbage Aphids.

(Myaus persuae and Browncoryne brassuae.)

It is often necessary to control cabbage aphids as well as cabbage moths on young cabbage or cauliflower plants, and for this purpose, depending upon which species is present, a derris or nicotine dust may be used. The flower-stalks and buds may also become infested, with either species of these aphids and seriously injured.

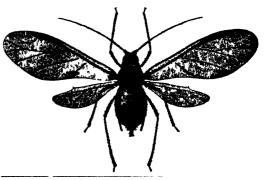


The Cabbage Moth, (Enlarged.)

It is more expensive to use derris than lead arsenate for the early stages of growth, but where derris is applied every seven to ten days throughout the crop, it also controls the green aphids and its use is recommended in intensely cultivated coastal areas.

Derris dust, however, is not effective against the slaty-grey aphids which predominate in inland areas. These aphids occur in clusters, mainly on the upper surfaces of the leaves, and for their control a nicotine dust is recommended. For the young plants, therefore, when these aphids are present the nicotine may be added to the lead arsenate in the following proportions:—

(1) Lead arsenate powder ... 8 lb.
Hydrated lime ...... 8 lb.
Nicotine sulphate ..... 1 lb.



The Winged Form of the Green Cabbage Aphid
(Enlarged)

1 his aphid also infests peach trees

Old seed-beds and the butts and unsaleable plants remaining after cutting should be cleaned up to prevent moths from breeding and infesting later crops

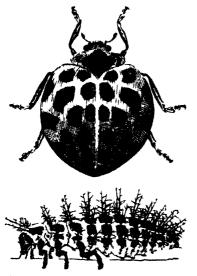
# The Leaf-eating Ladybird Beetle.

(Epilachna 28-punctata)

THE adults and larvae of this insect attack the foliage of potatoes, tomatoes, melons and pumpkins. They feed on the upper surfaces of the leaves and cause them to become skeletonized and withered.

The eggs, which are spindle-shaped and yellow, are laid in groups upon the upper surfaces of the leaves. The larvae or grubs are stout-bodied, and dull-yellow, marked with light-brown. They are covered with numbers of branching black spines and are

thus readily distinguished from all other grubs. When fully-fed these larvae attach themselves side by side to the leaves of their food-plant, and there enter their pupal or chrysalis stage.



Adult and Spiny Larva of the Leaf-eating Ladybird Beetle

The adult ladybird is orange-yellow and closely spotted with twenty-eight irregular black markings. In general appearance it closely resembles the eighteen-spotted ladybird beetle (*Leis conformis*), a beneficial species which feeds upon aphids, but this useful species is a brighter yellow, more hemispherical in form and usually very shiny. The wing-covers of the leaf-eating ladybird are not so shiny and have a downy appearance.

Potato plants may be dusted with 20 per cent lead arsenate dust, two applications with an interval of ten days usually being necessary. Spraying with lead arsenate powder at the rate of 1 lb to 20 gallons of water may be employed to control them, but it is not as effective as the dust.

Plants, such as pumpkin, melon, squash, cucumber, etc., may be protected while they are young by dusting them with a mixture of equal quantities of tobacco dust and hydrated lime. Pyrethrum powder 1 part mixed with 4 parts of kaolin or flour may also be used. Injury may be caused to young plants by the use of arsenate of lead.



# Triplets.

IFRSTY COW "Wagga Truda," with her three calves (two males, one temale) born
February 2 1942

# The Department Grows Vegetable Seed.

In addition to undertaking, the large-scale production of vegetables at Yanco, the Division of Plant Industry of the Department of Agriculture is giving a further lead to farmers in the matter of vegetable seed production

During the present season a total of eighty acres will be devoted to vegetable seed production at

the Leeton Experiment Farm and the Riverina Welfare Farm, at Yanco The greater part of this area will be devoted to carrots, parsnips and bectroot, but seed crops of silver beet, onions, lettuce and leeks are also being grown It is hoped to produce sufficient seed to sow 4,000-5,000 acres with these vegetables next season

# PLANT DISEASES



# Notes contributed by the Biological Branch



# Bordeaux Mixture

The Best Spray for Fungous Diseases.

BORDEAUX mixture is the best spray for the prevention of fungous diseases of the foliage and above-ground parts of plants. It is prepared by mixing together a bluestone (copper sulphate) solution and a lime suspension in one or other of the ways described below. It is often advisable to add a spreader or wetting agent, e.g., White or Red Oil, "Agral 3," "Wetsit," &c., to the spray mixture in order that it may spread satisfactorily over the plant. In order to obtain best results, Bordeaux mixture should be used immediately it is made If it must be kept till the following day, 2 ozs. of sugar should be dissolved and stirred into every 40 gallons to retard its decomposition.

Bordeaux mixture is used at different strengths, which may vary according to the crop which is to be sprayed or the disease for the control of which the spray is to be used One strength of Bordeaux mixture is 6-4-40 The first figure (6) in this formula indicates the number of pounds of bluestone the second figure (4) the number of pounds of lime and the third figure (40), the number of gallons of water in the mixture. In the same way Bordeaux 6-4-80 is a spray containing 6 lb of bluestone 4 lb of lime, and 80 gallons of water, and Bordeaux 1-1-10 is a spray prepared from I lb of bluestone. I lb of lime, and 10 gallons of water There are various other formulæ, but they can all be read the same way.

The recommended quantities of stone lime or hydrated lime are in excess of the amounts actually required to neutralise the bluestone, but they make an alkaline mixture which in Departmental experience, gives best results

#### The Ingredients.

Bluestone may be obtained either in the form of large or small crystals or fine powder. It should always be dissolved in a wooden earthenware, or copper container Iron and galvanised from vessels must not be used.

The lune used in the preparation of Bordeaux mixture should be freshly burnt stone lime (quicklime), or good quality hydrated lime. In the latter case, the amount required is one and a half times the quantity stated for stone lime, e.g. instead of using 4 lb of stone lime o lb of hydrated lime are necessary.

### Preparation of Bordeaux Mixture.

It is essential that Bordeaux mixture should be properly prepared if best results are to be obtained from its use. The quality is largely dependent on the fineness of the particles in the mixture—the coarser the particles the quicker will they settle out and the less adhesive will be the spray residue left on the plant or tree.

A properly-prepared Bordeaux will not commence to settle for some minutes, and the greater proportion will remain in suspension for some hours. The suspension should be kept thoroughly agitated during spraying.

The following methods refer to the preparation of 6-4-40 Bordeaux. When this formula is to be varied, corresponding changes must be made in the amounts of bluestone, lime and water used.

Let it be assumed that 40 gallons of 6-4-40 Bordeaux are to be prepared, and one barrel, or a spray outfit, is available.

- (a) Dissolve the bluestone (6 lb) in 9-10ths of the water (36 gallons) in the barrel or spray tank. If the blustone is in the form of large crystals it may be tied loosely in a hessian bag and suspended just below the level of the surface of the water overnight until dissolved. It can be dissolved more quickly if a few gallons of hot water are slowly poured over it. If thrown loosely into the bottom the crystals will not dissolve unless the mixture is constantly stirred for a long period. If the bluestone is in the form of small crystals or fine powder, the required quantity may be washed through a sieve into the barrel or spray tank, when it may be dissolved after slight stirring or agitation of the liquid.
- (b) Slake the lime (4 lb) in a kerosene tin or other conveniently-sized container, add small successive quantities of water to the lime until it crumbles and powders, when more water is added to provide a milky mixture, and finally make up to 4 gallons. If hydrated lime is used, mix 6 lb. into a paste with water and make up to 4 gallons.
- (c) Slowly pour the lime through a finemesh strainer into the bluestone solution in the wooden barrel or spray tank. Particular care must be taken to stir the bluestone solu-

tion with a wooden paddle whilst the lime is being added, otherwise an inferior Bordeaux will result. In the case of a power spray the agitator should be set in operation.

#### Stock Solutions.

If large quantities of Bordeaux mixture are being used, it often saves time and is more convenient to make a stock solution of bluestone for use as required. Such a



Part of Bean Stem, Showing Cottony Growth of Scierotinia.

stock solution can be made in a large wooden barrel of a strength, say, of I lb. to I gallon of water. When mixing the spray, I gallon of this solution is used for every pound of bluestone required. A mark should be made at the level of the liquid after removing any of the stock solution, so that if evaporation occurs it can be compensated for by the addition of more water before the next quantity is measured out.

In a similar manner a weighed quantity of lime can be slaked in a large receptacle and made up to a definite volume. One pound of lime to I gallon of water will make a suitable stock solution. The lime suspension should be well stirred before removing any for use. Provision should be made, as in the case of the bluestone stock solution, to allow for compensation for water lost by evaporation.

In each case the stock solutions should be kept well covered when not in use.

When preparing spray from stock solution, proceed as directed originally when using solid materials, but in this case read gallons instead of pounds, e.g., if 40 gallons of 6-4-40 Bordeaux are required, first dilute the 6 gallons of bluestone stock solution to 36 gallons, then pour in the 4 gallons of limestone stock solution. Do not mix the stock solutions together; always dilute the bluestone stock in any case before mixing.

# Diseases Caused by the Fungus Sclerotinia.

#### Lettuce.

The disease known to growers as "drop" or "watery rot" takes a heavy toll during the cooler months of the year in coastal lettuce-growing districts. Fortunately it has not yet spread to all sections, and growers should be on their guard to prevent it becoming established in areas which are now free.

The first symptom usually observed is the wilting of the outer leaves and this is followed by the collapse of the whole plant. lar bodies up to an inch in length. It is by means of these sclerotia, which function as reproductive bodies, that the fungus can live in the soil from season to season.

#### Control.

If the disease has appeared for the first time and not many plants are affected, it is worth while making an attempt to eradicate it at once. Carefully remove all infected plants and any sclerotia which may



An examination of the base of the plant will reveal a cottony growth of fungous threads around the stem and bases of the outer leaves. The stem may be partially or completely rotted, the rot being of the soft watery type. As the disease progresses further, the really characteristic feature of the disease, the sclerotia, will be found in the partly rotted tissue between the leaves and around the stem. These are at first white and firm, but soon become black. When mature they are hard, oval or irregu-

have formed and burn them. The systematic collection and burning of diseased plants and their attached sclerotia should be carried out, as it greatly assists in keeping the disease in reasonable bounds.

Cool, moist weather favours the disease, and there is little risk of loss during the summer.

Other susceptible crops include beans, cabbage, celery and a number of common weeds. Considerable damage is caused in some years to citrus trees and passion vines.

#### Citrus and Passion Fruit.

Sclerotinia causes blighting of twigs or even quite large limbs of citrus trees in late winter or early spring. It can be distinguished by the pale colour of the affected



Collar Rot of Passion Vine Caused by Sclerotinia

parts, a tendency of the dead leaves to remain attached to the stein, the presence of sclerotia, and the development of gum at the lower edge of the affected area.

A gumming of the collar-rot type at the base of the trunk can also be caused, and in some years a severe nursery blight is due to this fungus. Late blossoming and development of shoots during cooler autumn months provide material favourable for subsequent infection by Sclerotinia.

No spray treatment can be recommended for this phase of the disease, but care should be taken to remove and burn affected parts during pruning operations.

Sclerotima is capable of causing a severe blight of the shoots of passion vines, and also a collar rot, by attacking the main stem at ground level. Features of the disease are yellowing and wilting of leaves and a tendency of infected parts of the stem to become shredded. Sclerotia will often be found in the hollow stems. Affected parts should be removed and burned

# Armillaria Root Rot of Citrus.

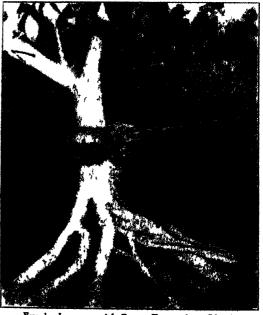
Citrus growers whose trees are treated for armillaria should make regular inspections of the excavations around the crown roots to make sure that they have not become filled up. The recent heavy rains will probably have resulted in a considerable amount of soil and rubbish being washed around the butts, and this should be removed as soon as possible. Weeds should not be permitted to grow round the butts of treated trees, as they interfere with rapid drying out after rain or heavy dew. Excessive weed growth can do a lot to spoil the effect of excavation especially in damp weather

# New Plant Diseases.

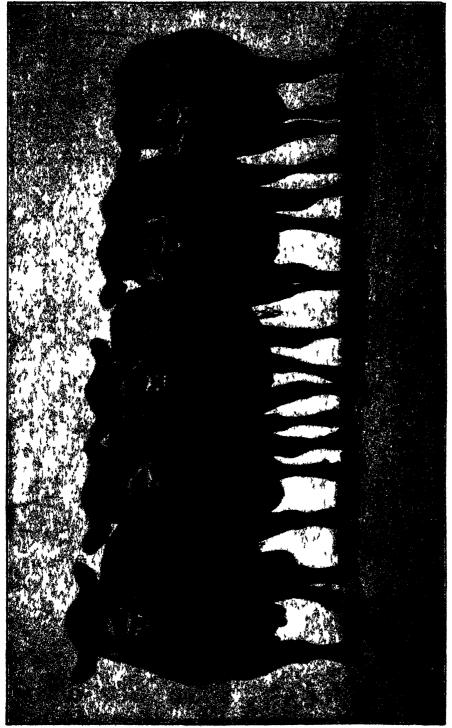
DURING March, 1942, the following diseases were recorded for the first time in New South Wales:

Pancus carota, carrot Rosette (virus?), Bathurst.

Pastinaca sativa, parsnip. Rosette (virus t), Gosford.



Eureka Lemon, with Roots Exposed to Check Armillaria.



"Like Peas in a Pod."
ue to Type. The Photograph Shows a Sire and His Progeny. The Aberdeen Angus Breeds True to Type.

(LA.R.I.)



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AUSTRALORP:		4		10	B			50	1			25			1	00	)		_	60				25	
AUSTRALORP: Day-old chicks 3 weeks old	•••		£3 5	5	0	•••	£(	15	0	***	£O	18	6	1	£8	5	0	•••	£3 4	5	0	•••	£i 2	15	0
CROSSBRED: Day-old chicks 3 weeks old			3	5 5	0	•••	1 2	15 15	0	•••	9	19	6		6	5	0	•••	3 4	5	0	•••	!	15	0
WHITE LEGHORN: Day-old chicks 3 weeks old																									
COCKERELS:			P	rio	08	on i	<b>P</b> P	lic	ati	) ]]											_	•••		_	

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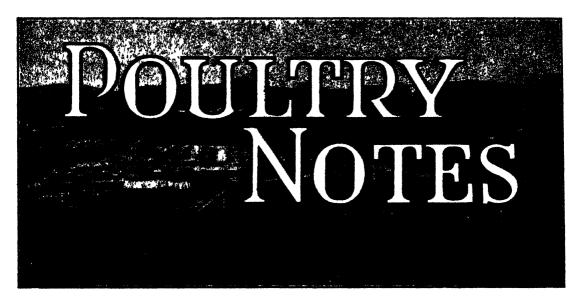
Standardised Analysis: — 47/50% Proteins. 30/33% Minerals. 8% Moisture.

Guaranteed Analysis:—Minimum Crude Protein 60%. Minimum Crude Fat 9%. Moisture 8%.

Guaranteed Analysis:—Moisture 5.4%. Protein 8.5%. Fat 1.5%. Minerals 86%.

### Obtainable from-

- Riverstone Meet Co. Pty. Ltd., 5 O'Connell Street, Sydney.
- Zedbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- W. Angliss & Co. (Aust.) Pty. Ltd., 42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Orsek, Bockhampton.



NOTWITIISTANDING the rapid improvement in egg prices which took place in March, there are still many poultry farmers who have not yet decided what to do regarding the coming rearing season; unless preparations are made at once, they are likely to be too late for early chickens. Taking into consideration the large numbers who left the industry during the past few months, and others who have reduced their flocks owing to shortage of labour; also the increased demand for eggs for the military forces; there should now be no hesitation about going right ahead with normal preparations for the rearing season.

It is unlikely that there will be many newcomers into the industry during the war, and it is probable that further numbers will relinquish the business, either to take up war work or join the forces. Thus the reduction in production which has already taken place, due to these and other causes, will probably not be made up again for the duration of the war, and unless something unforscen occurs to affect the position, there should be some appreciable improvement in returns.

# Factors Affecting Egg Quality.

Prior to control, by the Egg Marketing Board, of eggs in country districts, a large percentage, particularly from small producers, was sold through the local storekeepers who, taking the good with the bad, paid a price which allowed for the rejection of unsaleable eggs. Under these conditions, many producers were probably not informed when eggs had to be rejected out of their consignments, but when eggs are now consigned to the Board's depots, they are paid for according to grade, and thus eggs of poor quality realise low prices. while those of first grade return the highest rate fixed by the Board. Therefore the aim of all producers must be to ensure that everything possible is done to keep up the standard of quality in order to obtain the maximum returns.

There are many factors in the handling of eggs which have a bearing upon quality, and advice in this connection should assist producers who experience unsatisfactory returns.

### Keeping Eggs Clean.

Keeping the eggs as clean as possible and thus obviating the necessity for washing a large proportion of them will assist in the reduction of quality troubles; it should be realised that when eggs are washed, particularly if they are not dried, there is a greater risk of infection by bacteria, thus causing a deterioration in quality.

While it is difficult to keep eggs clean in wet weather, much can be done under dry weather conditions to minimise the number of dirty eggs. One of the first requirements in keeping eggs clean is to provide adequate nests and keep the nesting material clean. Nests divided into compartments of approximately 13 inches long by 9½ inches wide, and 6 to 7 inches deep, are preferable to long nests without divisions, as there is a tendency for the birds to crowd at one end of the long nests. It is necessary to provide one compartment of the size mentioned for each five liens. The most satisfactory material for the nests is shell grit, preferably with a layer of rice hulls on top, but the shell grit in the nests should not be depended upon for the requirements of the birds, as they will not eat it after it becomes soiled. If straw or rice hulls only are used, the birds quickly scratch these materials out, thus leaving the bottom of the nests bare and causing breakages. The nests should be placed in a darkened position rather than be exposed to the light, as the birds prefer some seclusion.

The next requirement is to keep the houses reasonably clean, and much can be done in this direction by using some absorbent material such as rice hulls, straw, sand, or sawdust, etc., on the floors of the houses to assist in keeping the feet of the birds from becoming dirty. Concrete or wooden floors are essential to enable the houses to be kept clean.

Collecting the eggs at least twice daily will reduce the number of those becoming soiled, and covering the collecting bucket with a sheet in rainy weather will avoid much trouble.

If some of the fowls roost in the nests at night, it is an easy matter to arrange a closing device by having a hinged alighting board which could be closed after the last collection. Other measures for minimising the number of dirty eggs, are to avoid over-crowding of the houses, and, if semi-intensive houses are in use, to close in the birds during wet weather.

# To Prevent Breakages.

To prevent breakages during the collection of the eggs, care should be taken that the container in which they are collected has rigid sides. For instance, if a kerosene tin is used, it should have one side cut out and a wooden division fitted in the middle to prevent the sides from sagging inwards as the tin is filled. The tin should also have two handles, joined together to equalise the weight. A pad of straw or other material should be placed in the bottom of the collecting tin to save jarring and breaking eggs in the bottom.

In the hot weather, particularly, it is advisable to remove any male birds from the pens, as fertile eggs will deteriorate more rapidly than those which are infertile, due to the development of the embryo. Leaving the eggs standing in the sun, even for a short length of time, should be avoided.

While it is realised that it might be difficult for many country producers to carry out all the suggestions given, every effort should be made to improve conditions at the production end, so as to ensure the highest quality eggs being placed on the market.

# Egg-laying Competition at Hawkesbury Agricultural College.

# Comments by Mr. E. Hadlington, Poultry Expert.

THIS, the Fortieth Egg-laying Test conducted at Hawkesbury Agricultural College, covering a period of 350 days, was notable for at least two records, one the highest general average, viz., 210 eggs per bird, and the other the highest group score for light breeds, viz., 1,540 eggs. The previous highest general average was 200, in the

twenty-third test. The group score for White Leghorns has been exceeded by heavy breeds on several occasions, the record being 1,613 in the sixteenth test, but the previous highest total for White Leghorns was 1.531. The average for White Leghorns, of 214 eggs, has only been beaten on one occasion—in the fifteenth competition—when it was 216 eggs per bird.

As in last year's test, White Leghorns have carried off the two main prizes, the Grand Champion and the Golden Egg, as well as that for the highest individual score, and a number of minor prizes.

The Grand Champion prize of £10 10s, which is awarded for the group laying eggs of the highest market value without replacement of a bird, goes to Wimbleford Poultry Farm with a market value of £6 15s., thus adding to the fine array of major prizes won by this farm in this competition in recent years

The Golden Egg Trophy, valued at £15 15s, donated by the Metropolitan Meat Industry Commissioner, was won by a newcomer into the competition, Mr R. J. Cooper, of Hoxton Park This prize is awarded on points for quality of birds and number of eggs, and Mr Cooper's pen scored a total of 98 points

The Grand Champion and Golden Egg Consolation trophies were won by a pen of Langshans entered by the late Mr F. C Nicholls, whose death during the currency of the competition is regretted. The late Mr Nicholls was noted as a breeder of Langshans, and was a successful competitor in these competitions for many years

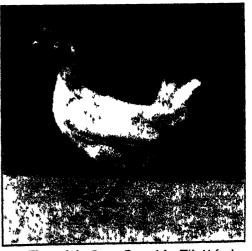
The Grand Champion Consolation Trophy, valued at £7 7s. is donated by the Flour Millowners' Association, and awarded on the same basis as the Grand Champion Prize, in the section opposite the winner of that prize, and the Golden Egg Consolation Trophy, valued at £10 tos, donated by the Metropolitan Meat Industry Commissioner, is awarded on the same points as the Golden Egg, but in the section opposite the winner of that trophy The late Mr Nicholls' pen laid 1,462 eggs having a market value of £6 8s. 4d.

The J Hadlington Commemoration Medal donated by Mr. D R Dove for the pen of birds scoring the highest number of points for quality, also weight of birds and weight of eggs, was won by Mr. W. Knott, with a total of 95½ points.

The C. W Robinson Trophy, valued at £10 10s., awarded for the highest number of quality points scored by pullets in the competition and the male birds in the male bird competition, was again won by Mr. N. Judson, who carried off this prize last year.







Three of the Group Entered by Wimbieford Poultry Farm. Winner of the Grand Championship 1941-42

Page 245

# General Average Production.

The record general average production in this competition is particularly gratifying in view of the fact that the figure has remained practically stationary at around 200 during the past ten years; it was 201 last year. Possibly the dry weather conditions have been a factor contributing towards this improvement.

The average egg production and the weights of eggs for the different breeds compared with last year, are shown hereunder:—

	Breed.		Average Egg Production.	Average Egg Weight per dozen.
	194	41-4	2.	
				oz.
402	White Leghorns		214.3	25.8
96	Australorps		200.5	25.8
24	Langshans		215.8	26.0
12	Rhode Island Reds		181.5	24.9
6	Buff Orpingtons		150.1	26.1
	194	10-4	I.	
390	White Leghorns	1	203.9	26.3
102	Australorps		198.8	26.0
24	Langshans		205.4	26.2
24	Rhode Island Reds		149.9	25.9

From these figures it will be seen that Langshans have again kept up their reputation for high producers, and in view of their consistency in this regard, it is difficult to understand why this breed does not become more popular on commercial farms.

#### Mortality.

During the year there were twenty-seven deaths from natural causes among the White Leghorns and fifteen in the heavy breeds, while four Leghorns and one heavy breed were replaced owing to sickness, and two Leghorns were killed, one by foxes and the other by accident. Thus the actual mortality amounts to about 8 per cent. This is about the same as for several years past.

### Disqualification for Under-weight Eggs.

It is pleasing to see that there is some improvement with regard to the number of birds disqualified for under-weight eggs and those not laying the required number of eggs during the weighing period, the total number this year being fifty-five individuals compared with fifty-eight last year.

while ten less groups were disqualified. The particulars are as follows:—

•	1940-41.	1941-42.
Individual White Leghorn Individual Heavy Breeds		39 16
Totals	. 58	55
White Leghorn Groups Heavy Breed Groups	1 ~	10 3
Totals	. 23	13

Included in these figures are six individual White Leghorns and four heavy breeds which failed to lay the required number of eggs during the weighing period.

### The Financial Aspect.

As was anticipated, the cost of feeding in this test was somewhat higher than during last year, being 8s. as against 7s. 3d. This, together with the lower average price for eggs, made a considerable difference in the average profit per bird, which was only 11s. compared with 12s. 2d. last year. The commercial poultry farmer has felt the effect of the lower returns, and this has resulted in quite a number being forced out of the business.

Full Report of Egg-laying Competition.

FULL details of the 1941-42 Hawkesbury Agricultural College Egg-laying Competition are available in leaflet form and will be supplied on application to the Department, Box 36A, G.P.O., Sydney.

The position of a commercial poultry farmer with a flock laying an average of only 12 dozen eggs per hen per annum, would not be as satisfactory as indicated by the competition figures, as the average net return per dozen for eggs on a 12 dozen average production, would only work out at 1s. per dozen, or 12s. per hen, from which would be deducted 8s. for cost of feed, leaving a profit of only 4s. per hen for the year, as against 6s. during the past two years. Those who were unable to obtain supplies of mill offals would be even worse off, as the cost of feeding would be higher.

The average return of 4s, per hen is the lowest since the inception of these tests forty years ago, and it is hoped that some improvement will be shown during the next twelve months.

# Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry. Date.	Owner and Address.	Number Tested.	Expiry Date.
	- <del></del>	1942.		1	1943.
O Limited H CA Large Dalma H Variance and	1		Lunacy Department, Callan Park Mental		
E. Liggins, "St. Leger Dairy," Kuring-gai Chase Road, Turramurra North		6 May.	Hospital	29	9 Jan
I Taches " Mandamer" Berriera	45		Lunacy Department, Parramatta Mental		6 Feb
I. Toohey, "Mandemar," Berrima T. Reid, "Narrangullen," Yasa	56 160	"	Hospital The Sydney Church of England Grammar	31	O Lei
I. Reid, "Narrangulien," Yasa IS N. C. Brenan, Arrankamp, Bowrai	23	_=	Cabaal Wasa Mala	55	6
H. Newman, "Bunnigalore," Belanglo, via	-3	15 ,,	Tudor House School, Moss Vale	17	2 "
Sutton Forest	10	z5 "	Koyong School, Moss Vale	2	2 "
rrer Memorial Agricultural High School,	ן יי	., C.	New England Girls' Grammar School, Armidale	25	2 "
Nemingha	27	17 ,,	A. E. Stace, Taylor Street, Armidale	31	7 ::
rm Home for Boys, Mittagong	56	18 ,,	New England University College, Armidale	13	z Mar
nu Plains Prison Farm	110	19 ,,	A. C. O'Dea, Perry Street, Dundas	28	19 ,,
M. Edwards, Uralia	5	22 ,,	Trangie Experiment Farm, Trangie	138	19
N. Coote, Auburn Vale Road, Inverall	30	22 ,,	Lunacy Department, Morisset Mentas Hospital		25
East, Gum Flat Road, Inverell	41	22	Berry Training Farm, Berry	114	2 Ap
Brownlaw, Gol Gol	34	26 ,,	R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	3 ,,
w England Experiment Farm, Glen Innes	34	"	Liverpool State Hospital and Home	102	10 ,,
Terseys	64	27 ,,	H. F. White, Bald Blair, Guyra (Aberdeen		
Boland, "Seaton," Invereil	14	28 ,,	Angus)	137	26 ,
D. Hordern, Cabramatta (A.I.S.)		29 11	F. C. Harcombe, Hillcrest Farm, Warialda	-5,	
mond Bros., Morisset	56	30 ,,	Road, Inverell	32	15 Ma
Michael's Orphanage, Baulkham Hills	21	31 "	A. N. De Fraine, Reservoir Hill, Inverell	22	15 "
icombe State Hospital and Home	146	13 June.		6	30 ,,
L. Killen, "Pine Park," Mumbil	1	20 ,,	Cowra Experiment Farm	41	27 Ju
D. Frater, Inverell	104	23 "	Kahlua Pastoral Co., "Kahlua," Coolac	314	10 ]1
nacy Department, Rydalmere Mental		"	W. Budden, "Hunter View," Kayuga Road,		
Hospital	48	27 ,,	Muswellbrook	18	5 Au
J. Wilks. "Oaks Farm," Muswellbrook	45	28 ,,	W. Williams, Dunreath, Inverell	32	29 "
S. Grant, Braidwood	14	14 July.	The William Thompson Masonic School,		
Hannaford	24	14 ,,	Baulkham Hills	50	29 ,.
Vincent's Boys' Home, Westmead	19	19 ,,	Navua Ltd., Grose Wold, via Richmond		1
irlstone Agricultural High School, Glenfield	33	26 ,,	(Jerseys)	113	4 Sej
Turnbull. "Riverview," Muswellbrook		5 Aug.	Australian Missionary College, Cooranbong	113	8 ,,
el River Land and Mineral Co., Tamworth			Department of Education, Gosford Farm		Í
(Beel Shorthorns)	16	8 ,,	Home	40	29 ,,,
I. Fairbairn, Woomargama	210	26 Sept.	A. L. Logue, "Thornbro," Muswellbrook	46	13 Oc
and C. Ryall, 5 Western Avenue, West		بما	Barnardo Farm School, Mowbray Park	48	4 .5
Wollongong	57	z Oct.	Lunacy Department, Kenmore Mental Hospital		5 No
J. Stephenson, "Hill View," Fig Tree	23	10 ,,	Wollongbar Experiment Farm	112	4 De
C. Wyatt. Sherwood Road, Merrylands		12 ,,	State Penitentiary, Long Bay	10	9 "
sman Bros., Inverell	25	17	Department of Education Vance & mississes	1	194
wkesbury Agricultural College, Richmond		18	Department of Education, Yanco Agricultural		6 Fe
(Jerseys)	128		Riverina Welfare Farm, Yanco	69	
geuhoe Estates, Scone	65	31 Oct.	Ca Tomosius College Dir sondam	74	"
Hospital		I4 Nov.	C. Wilton, Bligh Street, Muswellbrook	25	27 ,,
thurst Experiment Farm (Ayrshires)	22		N. L. Forster, Abington, Armidale (Aberdeen	75	3 Ma
W. Martin, "Narcoma," Urana Road,	21	18 ,,	Angus)	188	12
tti		29	Forster and Sons, Abington, Armidale (Jerseys)	87	
G. Wilson, Exeter (Jerseys)	68	29 ,,	Wagga Experiment Farm (Jerseys)	1 0/	13 ,,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook. Municipality of Queanbeyan.

Max Henry, Chief of Division of Animal Industry



War Secrets Spread Like a Bush Fire.



# Brucellosis-free Herd Scheme (Swine).

#### LIST OF ACCREDITED HERDS.

I me following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the sesting of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Adams, J. P., "Melton," Daysdale.
Adard, S. R., Cleobury Stud, Werombie Road, via Camden
Bathurst Experiment Farm, Bathurst.
Campbell, D., Hillangrove, "Wamberal," via Gosford.
Chapman, G. E. and Son, "Illabo Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Cro.t F., Lugwardine, Kentucky.
Draper R E., "Glengar," Capertee.
Bade, E. M. "Bade Vale," Eucharcena.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Genge, J. I., "Springfield," Eugowra.
Grafton Experiment Farm, Grafton.
Grabam, E. H. Kinilabah Stud, Wagga.
Harris, K. H. Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College, Richmond.

Hends.

Hennessey, J., Pacific Stud Piggery, Holgate.

Holland, A. L. Atgonne, Tubbul.

Liverpool State Hospital and Home, Liverpool.

Maybin, N. C., Towac, Orange.

Macarthur (John) Memorial Agricultural High School, Glenfield

McCaughey Memorial Agricultural High School, Yanco.

New England Experiment Farm, Glen Innes.

Newington State Hospital and Home, Newington.

Riverina Welfare Farm, Yanco.

Government Agricultural Training Farm, Scheyville.

Shirley, G. F., "Camelot," Penrith.

Smith, J. M., Bulo Glen, Urana.

Stewart, Sir Frederick, "St. Cloud" Dundaa.

Wagga Experiment Farm, Bomen.

White, A. N., Blakeney Stud, Orange.

Williams, G. R. B., "Gwandalan," Grenfell,

Wilson, A. G., Blytheswood, Exeter.

Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

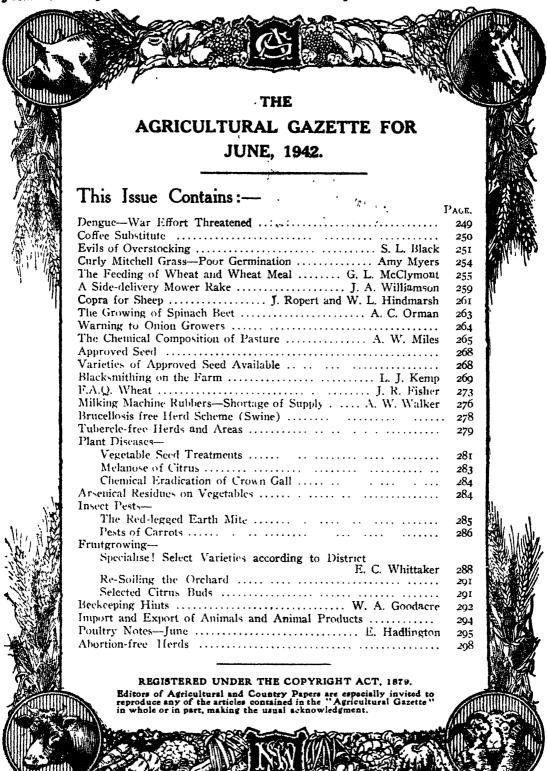
Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla
Emu Plains Prison Farm, Emu l'lains.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulbura.
Kenmore Mental Hospital, Kenmore, via Goulburn.
Masters and Upston, Whitmore Stud Farm, Wamberal, via
Gosford.

Morisset Mental Hospital, Morisset.
Oberon Prison Camp, Oberon.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V., Marata, Harrow Road, Glenfield.
Punnett, R. S., Brawlin.
Smith, C. W J., "Norbiton," Canadian Lead
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

# Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Own-r and Address	Number in herd.	Owner and Address.	Number in berd.
Bathurst Experiment Farm (Ayrshires) Bauerle, P. A., Holbrook Bush, W., Ben Lomond Carrick, G., 'Clonlea," Central Tilba Cowra Experiment Farm (Ayrshires) Curtis, A., Maryla, Morven Department of Education—Farm thome for Boys, Gosford Department of Education—Farm thome for Boys, Mittagong Mittagong Mittagong Mittagong Mittagong Mittagong Mittagong Mittagong Farron School, Molong Farrer Memorial Agricultural High School, Nemingha. Forster and Sons, Abington, Armidale (Jerseys) Fastrbridge Farm School, Molong Forster, N. L., Abington, Armidale (Jerseys) Hoks, A. A., Estate, Culcairn Hill, E Pritchard, Bowling Alley Pt. (Jerseys) Hordern, E. D., Cabramatta (A.I.S.) Hurlstone Agricultural High School, Glenfield Kenmore Mental Hospital, Kenmore Killen, E. L., "Pine Park," Mumbil Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus) McSachern, H., Tarcutta (Red Po'l) McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	20 34 41 35 40 38 24 4 75 27 68 174 108 43 100 95 100 202 48	McSweeney, W. J., "The Rivers," Canowindra (Beef Shorthorns) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital Navua Ltd., Grose Wold, via Richmond (Jerseys) New England Experiment Farm, Gien Innes (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., (Beef Shorthorns) Tamworth. Reid, G. T., "Narrangullen," Yass Robertson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud, Spurway- street, Dundas Trangle Experiment Farm, Trangle Wagga Experiment Farm, Bomen, N.S.W. Walker, Jas. R., "Strathdoom," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen Angus) Williams, Chas., Ben Lomond Young, A. H., Rock Lynn," Cudal (Polled Beef Shorthorns)	31 125 80 132 97 660 120 127 138 557 82 306 68 81 32 7



## NEW MOTOR CARS



## but lots of weapons!

Perhaps you've heard about this change-over—possibly the greatest industrial revolution of all time. Its effect is that the man-power, machines and factories normally engaged in motor car manufacture are now operating as a gigantic source of supply for munitions of war.

Take General Motors part in the change over. In Australia it means that the 9,000 men and women who are G.M.H. are now making war equipment instead of motor cars.

In the General Motors factories of England, U.S.A., Canada, South Africa, India, Australia and New Zealand it means that more than 300,000 people have been switched to war production jobs.

That in turn makes available the planning ability of an industry, long famous for getting things done, to organise and put into operation new plants for volume production of tanks, aero engines, guns, shells, bombs, and other essential equipment.

As an example, one new G M. American plant on tank production is now 7 months ahead of schedule—it produced its first 31-ton tank in 47 days.

That, today, is the General Motors story in Australia as elsewhere . . . no motor cars for civil use, but an ever-increasing flow of weapons.

Who Develops Industry Serves Australia

### GENERAL MOTORS — HOLDEN'S LIMITED

Brisbane

Sydney

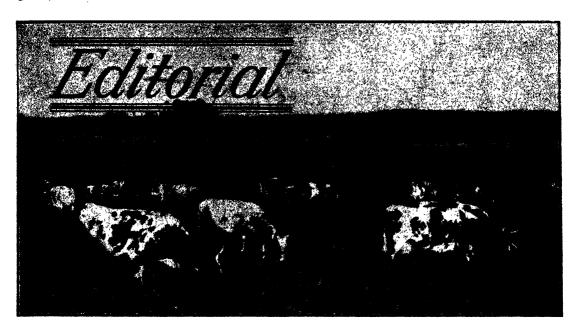
Melbourne

Adelaide

Perth

In these announcements, published from time to time, we are telling some of the war-time activities of General Motors in Australia and overseas.

BACK THEM UP-KEEP ON BUYING WAR SAVINGS CERTIFICATES



### The Agricultural Gazette.

June. 1942.

### Dengue.

## War Effort Threatened.

PUBLIC health, we are told, is threatened by an epidemic of dengue fever during the coming spring and summer unless immediate and effective steps are taken by the public and interested authorities to destroy or treat the breeding places of the tiger mosquito (Aedes aegypti), which transmits the disease.

Although the fever is rarely fatal—provided reasonable precautions are taken by persons affected—it is distressing enough to cause considerable personal inconvenience. Those affected find it impossible to carry on their normal activities sometimes for several days, to say nothing of the not uncommon depressing after-effects.

The history of previous epidemics in this state shows a high rate of infection—even as high as 85 per cent. in some closely settled communities. Nor have previous outbreaks of dengue been confined to isolated localities; they have been widespread in the portion of the State affected. A further disturbing aspect is that each epidemic (four have been recorded in New South Wales up

to 1926) has involved a larger section of the State than the previous one. The 1926 epidemic reached south to a line joining Newcastle, Tamworth and Bourke, but since that year the tiger mosquito has been found even as far south as Goulburn, Junee and Narrandera. In addition, entomologists can advance no good reason why the tiger mosquito could not breed anywhere in our south coastal region.

In view of the circumstances too little consideration has been given to the vast amount of damage an epidemic of dengue fever is capable of doing to the primary and secondary war industries of this State. A repetition of the dengue epidemic of 1926 could result in almost complete cessation of sections of essential industries for weeks at a time—a happening to be prevented at all costs. Labour shortage and drought have reduced production in some primary industries to a level that is sufficiently perturbing to justify extraordinary measures, if necessary, to prevent the operation of any additional adverse factor.

Fortunately the measures necessary to ward off the threatened epidemic are neither arduous nor expensive. The mosquito (Aedes aegypti) responsible for spreading dengue fever is much easier to combat than the more common mosquito (Culex fatigans). The dengue mosquito has never been known to breed in swamps, stagnant ground waters and the like, but favours water left in disused tins, drums, house tanks, guttering, etc. If every care is taken to treat these breeding places as recommended, the public will not only be safeguarding the community's health, but ensuring the continuance of a full-scale war effort in all industrial fields. Add to that the preservation of health among our fighting forces, and the job must be considered one worth doing expeditiously and thoroughly.

## Coffee Substitute

### Made from Wheat, Malt and Sugar.

THE following formula for cereal coffee, the result of experiments conducted by the Division of Plant Industry, Council for Scientific and Industrial Research, was obtained from the Commonwealth Department of Commerce. The formula is not suitable for use in the home, but the Department of Commerce is in touch with a number of firms with a view to production of cereal coffee on a commercial scale and at a reasonably low price.

### Preparation of Wheat.

- (a) Soak wheat for about three hours at room temperature of 20°C. (68°F.) or until the grain is just beginning to swell.
- (b) Drain the grain.
- (c) Cook under pressure of 15 lb. in an autoclave for forty minutes.
- (d) Dry at 100°C. (212°F.).
- (e) Roast at 200°C. (392°F.) for about three hours or until dark or chocolate brown in colour. During roasting, the grain should be agitated to give an even effect. A revolving drum should be suitable for large-scale roasting.

### Compounding of Ingredients.

- (a) Mix six parts of the roasted wheat with six parts of crystal malt and one part of sugar.
- (b) Bake the mixture in an oven at 200°C. until the sugar is caramelized on the

- malt and grain. Keep the mixture stirred at intervals so that the sugar does not caramelize at the bottom. Baking usually takes about one hour.
- (c) Cool the mixture, then grind to the consistency of finely ground coffee.

### Containers.

The cereal coffee should be kept in sealed packages or containers, otherwise it will absorb moisture slightly and may tend to pack.

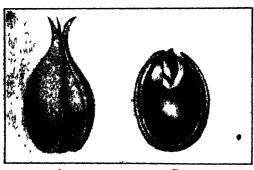
### Preparation of Beverage.

The beverage is prepared by percolation, milk and sugar being added to taste or, alternatively, by infusion with boiling water or milk. The milk may be fresh or powdered. Straining, as with coffee, may be necessary.

Use one heaped teaspoon of cereal coffee per tea cup

### "Common Seed Impurities of Lucerne": A Correction.

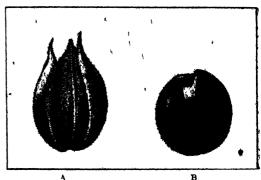
In an article, "Common Seed Impurities of Lucerne," in the September, 1941, issue of this journal the titles under the illustrations of common tumble weed and of pigweed are incorrect; they should be transposed. The illustrations with their correct titles are shown below



A B

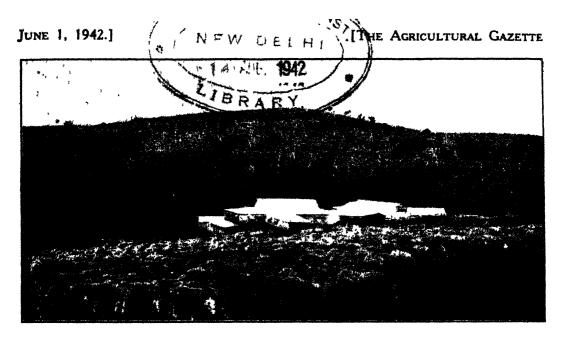
Pigweed (Amaranthus retroflerus)

A.—Husk B —Seed



Common Tumble Weed (Amaranihus albus.)

A - Husk B -- Seed



## Evils of Overstocking.

## Wasteful of Land, Pastures, Stock and Labour.

S. L. BLACK, M.R C.V.S., District Veterinary Officer.

OVERSTOCKING is a wasteful practice; wasteful of soil, pasture cover, labour and even animal life. It is a big factor in decreasing efficiency, which is doubly unfortunate in these perilous times, when survival of the nation depends so much upon maximum efficiency in every line of production, whether it be foodstuffs or munitions.

In the following article, compiled from notes of a recent broadcast address by Mr. S. L. Black, the adverse effects of overstocking are stressed, and the advantages, to both farm and farmer, as well as to the nation, of running fewer, better-cared-for stock outlined.

In raising livestock the aim should be to maintain animals from one year's end to the other in whatever condition enables them best to fulfil their mission in life. In the dairy cow, for instance, the condition in which she is maintained should be such as to enable her to bear one calf each year and to produce milk up to the standard for her breed. In the case of sheep, the ration fed or the pastures on which they have been running should enable them to breed normally, have sufficient milk to feed their lambs, maintain themselves in strong body condition, and grow a normal clip of wool both as regards quantity and quality.

### Loss Due to Overstocking.

There is seldom a year passes that one does not see evidence of dairy cows reduced

in condition far below what enables them to produce normally or economically. Indeed, in many cases they are literally starving and often show evidence of their deficient, morbid condition by chewing bones and other rubbish. Losses to the sheep raiser are also enormous, and include deaths through straight-out poverty, unthriftiness and retarded growth in young sheep, deaths amongst young lambs due to their mother's inability to support them, and lack of resistance to such complaints as toxaemia of pregnancy and worm infestation. As regards the wool clip, readers are familiar with the oft-repeated remarks by graziers on the adverse effect of shortage of feed on the weight and quality of the clip.

Without a doubt, therefore, the practice of overstocking of land, or any other factor

that causes animals to go short of feed, seriously reduces their efficiency.

### Make Best Use of Available Labour.

It would also be an advantage from the labour or manpower point of view to limit the number of stock carried to what could be fed without difficulty. Apart from the smaller number of animals to be handled, stock would be better fed. At lambing time ewes would be stronger and would require less attention. They would be in better condition and would therefore have more milk for their young. Lambs would be stronger and would require less looking after. The need to supply a supplementary diet at any time of the year would be less urgent. Due to better nourishment sheep, and more particularly young sheep, would be more resistant to gastro-intestinal parasites. would reduce to a minimum the need for drenching for worm infestation. Incidentally, in regard to worm treatment, certain medicines are becoming difficult to procure, and any action that can be taken to reduce the need for drenching is therefore well worth while.

### Reduce Soil Erosion.

A substantial reduction in the number of stock carried on much of the country should lead to decreased havoc from soil erosion, would raise the efficiency of stock running on such country and should enable the depleted manpower in many country districts to cope with the present position more satisfactorily. The remarks made are not meant to create the impression that stockowners should depend alone on decreasing the number of stock carried to eliminate entirely losses caused by under nourishment. Some action is, however, necessary to limit such losses and this offers the most immediate solution.

### Another Way Out.

It may be argued that for years agricultural scientists and others have been recommending the improvement of pasture lands and the growing and conserving of crops as a way out of the difficulty. This is undoubtedly the ideal way out, provided due regard is paid to limiting the number of stock carried until sufficient reserves of feed have been built up. We might, however, ask ourselves the question whether the pro-

gramme of growing and conserving of feed has ever been tackled earnestly. Only on very few places on the southern tablelands, to quote but one section of the State, has it been undertaken on anything like the scale that would be sufficient to meet the requirements of livestock. The position during recent seasons has fully demonstrated this.

### Reduce Stock to Prevent Overgrazing.

Accordingly, until some radical change can be made towards more and better farming and feed conserved on an extensive scale, it is felt that adequate adjustment should be made in the number of stock carried to prevent undue overgrazing of country and its attendant evils. Insofar as difficulties in seasonal conditions are concerned it is unfair to place too much of the blame there. All large continental countries have to contend with seasonal difficulties and irregularities. Admittedly these difficulties are often of a different type to those experienced in this country, but this does not mean that they are any easier to cope with.

### Substantial Reduction Warranted.

It may now be asked to what extent should livestock be unloaded from properties to give them a chance to recover and sward up properly with grass. It would be very difficult to give a straight-out answer to this question. A trip through almost any district in the State, even during a good season, will provide evidence of the extent that some properties are overgrazed as compared to others. There is little doubt, however, that on many holdings a reduction of 25 per cent, in the number of stock carried would be warranted if the land is to be given a chance to grass over. Indeed, there are some places that would require to reduce to an even greater extent than that to get results.

### Income Not Necessarily Affected.

The chief objection to a reduced stocking of holdings appears to be that the net income would go down. It is very doubtful whether this would occur to an appreciable degree if at all. Dairy farmers, in particular, are conversant with the vast difference in production that occurs when cows are well fed as compared to their level of production when on a sub-normal diet. The difference

that occurs in respect of sheep is not so spectacular but is nevertheless just as real. Particularly is this so when loss through deaths, under-development, unthriftiness, etc., are added to the reduced revenue from wool yield. Moreover, an important point not to be lost sight of would be the beneficial effect to the land itself. Almost any prospective purchaser of land realises how greatly the fettle and value of the land can be influenced by the treatment it has received.

### Surplus Feed Not Wasted.

Perhaps it may be felt that under a reduced stocking scheme feed would go to waste in favourable seasons. Even though a good season or good run of seasons produced a surplus of feed which could not be conserved as hay or ensilage, it would not be lost but returned to the soil as humus. Those whose work it is to study soils and plant life tell us that up to as much as 40 per cent, more moisture can be absorbed by soils that are rich in humus. The presence of a plentiful supply of humus in soil is therefore vital in areas where every drop of rain counts. Most of us have noticed the extent to which vast areas of country either become sparsely covered with vegetation or are entirely devoid of vegetation for long periods. When this takes place, and there has at the same time been no means in vogue to turn animal manure to its full account. It can be understood how seriously the soil is likely to be depleted of humus. The manner in which such country would suffer from dry weather can be realised.

### Improve Your Stock By Culling.

Enquiry may be made as to how a reduction in the number of stock carried could best be achieved. Undoubtedly by culling. Experienced livestock men realise to what extent culling can still assist in improving our herds and flocks. There is every reason to consider that the present should be a very opportune time to unload from holdings all nondescript animals and those that are not

of the conformation and quality that enables them to produce up to normal standard. Then, in many herds and flocks there are old animals that have passed their useful productive stage. There are also others that may be diseased or of a type which is susceptible to disease. Two examples of the latter type are:(1)The wrinkly breached sheep, which is known to be susceptible to blowfly attack; and (2) the cow with the "dropped" udder, which lacks resistance to mammitis.

### Objections Offset by Advantages.

No doubt there would be objections to heavy culling on the grounds that such animals would have to be sold at a low figure. Although this would be the case, the dehydration process now spoken of and advocated may make it possible to turn poor and old carcases to some useful account. from this, old animals would be of little value except for whatever their skins or hides realise. When we consider, however, that the rest of the stock on the place would be given a better chance as regards feed and management, and that they would be in a better position to produce and resist disease, the advantages of heavy culling should be well worth consideration.

Also, it must not be forgotten that the tendency is for animals to transmit their characteristics of conformation and quality to their offspring; in other words, for "like to produce like." Culling for type on a more lavish scale than usual should therefore result in a useful drive towards flock and herd improvement. Further, and this is a point of some importance, if in our livestock projects we can give any better treatment to the land than has been the case in the past, we should be doing something of considerable national value.

Finally, the outlook that is occasioned by poverty stricken or starving animals on a place is bad and should be relieved, if not removed, by the exercise of more discretion in stocking.

Help Win the War. Keep On Buying War Savings Certificates.

## Curly Mitchell Grass.

## Reasons for Poor Field Germination.

AMY MYERS, Seeds Officer.

ANALYSES of Curly Mitchell grass (Astrebla lappacea, Domin.), and germination tests carried out at intervals over a period of two years following harvest, indicate that newly harvested seed germinates poorly, and that germination increases with age up to about twelve months after harvest, maintaining that increase for at least another year.

Since commercial "seed" consists of spikelets bearing a variable number of flowers and therefore a variable number of seeds (caryopses), the percentage germination may vary in spite of optimum conditions. Those spikelets without seeds cannot germinate and those with three or four will have more chance of producing a seedling than those with only one. Therefore, in the laboratory, though a spikelet may produce more than one seedling, it is counted as one "seed" germinating.

### Reasons for Poor Germination.

For this reason, before the germination tests were begun, an analysis was made of 400 spikelets, in four lots of 100 each, to find the distribution of seeds per spikelet. The results, given in the table below, show that in this one parcel, while the maximum germination of spikelets may be 97 per cent., it may be reduced to 84 per cent. simply because there are 3 per cent. of spikelets without seeds in the one lot and 16 per cent. in the other. Also, though 18 per cent. of the remaining spikelets may contain one seed each, another 18 per cent may contain four seeds each, with a corresponding increase in the chances of seedling production.

### DISTRIBUTION OF SEEDS (CARYOPSES) PER SPIKELFT.

No of Spikelets containing o, 1, 2, 3, 4, 5 or 6 Seeds					Average of Seeds			
	0	1	2	3	4	5	6	Spikelet.
Spikelets— Sample 1 Sample 2 Sample 3 Sample 4	3 9 16 16	18 18 18	10 22 22 22 16	27 29 23 29	19 19 18 13	7 2 1 6	1 7 0	2 65 2 4 2 I 2 2 2

These results, together with those of the germination tests, which are given above,

may provide a reason for poor field germination, without considering any other factors.

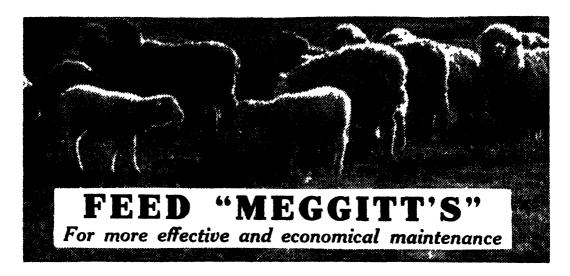
### Results of Germination Tests.

The seed for the germination tests was stored in a tin container, which, however, was not completely airtight, owing to the necessity for opening at frequent intervals.

The tests were made one, two, three and four weeks after harvest, then at six, eight, ten and twelve weeks, then at monthly intervals for mine months and lastly when the seed was eighteen months and two years Tests will be continued at yearly intervals till it becomes obvious that the seed has lost its viability. Germination at one week after harvest was 26 per cent, at one month 41 per cent., at six months 51 per cent., at twelve months 88 per cent, at eighteen months 80 per cent, and at two years 84 per cent. From these results it will be seen that germination increases with age up to twelve months and that freshlyharvested seed germinates poorly. Viability is maintained for at least two years following harvest.

An attempt was made to stimulate germination with a potassium nitrate solution and some response was obtained when the seed was two weeks old. The germination of the seed when the potassium nitrate solution was used as moisture was 59 per cent., while the control test germinated 45 per cent. However, such stimulus as there may have been when the seed was two weeks old was soon lost and this series was discontinued when the seed was three months old.

The sample with which these tests were made was harvested in June, 1939, on the property of Mr. Noel Barrett, Edgeroi, in the north-western district of this State.



## "MEGGITT'S" is highly nutritious and a laxative!

Meggitt's Linseed Sheep Muts are highly nutritious and (because of their linseed oil and vegetable nucilage content) a very valuable laxative. Being rich in digestible protein, they correct deficiencies of this essential nutrient in roughages, such as dried-off pastures, scrub, etc. They also prevent dry, fibrous feeds from causing digestive troubles, such as impaction, which during drought periods are a common cause of mortalities, particularly in young stock and in lambing ewes.

Because of these qualities a small quantity of "Meggitt's" fed as a supplement to dry feed makes a very big difference to the health and condition of sheep. They are enabled to make much better use of the natural feed than would otherwise be possible, and they are therefore maintained in healthier and stronger condition. The protein rich, conditioning, and laxative qualities of "Meggitt's" are particularly valuable in the feeding of ewes with lamb at foot, to stimulate their milk flow and so enable them to rear their lambs. As a supplement to

dry feed, "Meggitt's" is regarded as being the best of all milk-producing concentrates.

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## The Feeding of Wheat and Wheat meal To Farm Livestock.

G. L. McCLYMONT, B.V.Sc., Veterinary Officer.

WITH wheat available for stock feeding purposes at as low as 3s. per bushel in country areas many opportunities are provided for the economic utilisation of this grain per medium of animal products.

The purpose of this article is to discuss the suitability of both wheat grain and wheatmeal as food for the various classes of live stock, and to indicate the ways in which the stockowners can compare the cost of feeding wheat with that of other foods, when both the price and the nutrient value are considered.

MUCH prejudice exists concerning the use of wheat as stock food, which is not altogether merited, as when fed with a proper understanding of the reasons that have caused disappointments and the means of countering these, excellent results can be obtained with all stock.

The objections to the use of wheat are: t. The liability of ground wheat to form a doughy, unpalatable, indigestible mass when chewed. This is due to the peculiar nature of the gluten, a protein of wheat with properties not possessed by the proteins of other grains, and which gives wheat flour pre-eminence for bread manufacture. This disadvantage is easily countered by only feeding the grain coarsely ground and with other bulky foodstuffs.

2. The failure at times of drought-fed sheep to thrive on wheat grain, this being most noticeable with growing sheep. The recent work on calcium deficiency of sheep fed on cereal grains is a likely explanation of this failure as wheat is low in calcium (0.03 per cent.). The deficiency is easily

countered by the addition of I per cent. of ground limestone to the grain or the provision of a lick of equal parts salt and ground limestone.

3. The apparent unpalatability of wheat grain compared with other grains. Cattle and sheep being heavily fed on wheat grain may at times go off their feed. To prevent this, wheat should be fed, whenever possible, in a mixture. This mixing of grains has even greater value than that obtained by increased palatability, as the proteins of the various grains, not being identical in composition, supplement each other and produce a protein mixture of greater nutritional value than the protein from any single grain.

### Feeding Wheat to Swine.

It is fortunate that the wheat surplus coincides with the call by the Department of Supply for more pig meats, as this grain is easily fed to pigs, and at the present prices is a very economical feed.

On a comparative basis, wheat is of somewhat greater value for pigs than barley

or maize, perhaps on account of its greater protein content. The grain is best fed in a coarsely ground state, at least for pigs hand-fed, as the feed is usually then bolted; but for pigs self-fed the gain in food value obtained by grinding is probably outweighed by the increased cost, as self-fed pigs, having no incentive to bolt their food, masticate it well before swallowing. The gain in value for self-fed pigs is about 5 to 6 per cent., and with wheat at 3s. per bushel, about 3d. is saved per bushel. The cost of crushing is often estimated at about 2d. per bushel, so that if it can be done cheaper, it will pay to crush for self-fed pigs. Boiling or soaking will considerably reduce the food value of the grain for pigs.

South Australian experiments have indicated that wheat and barley fed in equal parts, with meat meal as a protein supplement have some advantage over either of the grains fed singly. The amounts of grain required to produce a gain of 1 lb. in a pig were, in one experiment:—

	ID.
Wheat grain	 2.93
Barley grain Mixture wheat and barley	 2.95
Mixture wheat and barley	 2.88

The type of carcase produced by wheat grain appears to be better than that produced by maize feeding, in that the fat is of a much firmer type with a higher melting point.

As with all other cereal grains, wheat must be fed with a protein supplement such as skim milk or meat meal to give quick and economical gains in weight. Green feed and a calcium-containing lick (as four parts ground limestone and one part salt) must also be provided. If good grazing is available, up to one-third of the grain ration can be saved, lucerne being especially valuable in this regard.

The quantities of skim milk and meat meal necessary to balance wheat, will depend largely on the amount of pasturage available. Assuming that only a little green feed is available—enough to fill the pigs' requirements for Vitamin A—the following schemes may be used:—

I. Wheat and meat meal may be fed in separate self-feeders, allowing the pigs to eat freely of each at their will. Some pigs will undoubtedly eat more meat meal than is absolutely necessary, but on an average

the pigs will take only as much as is required to balance the wheat and make quick gains in growth.

2. Meat meal may be mixed with the grain in the following manner:—

1st 4 weeks after weaning—10 per cent. 2nd 4 weeks after weaning—7½ per cent. 3rd 4 weeks after weaning—5 per cent. Till marketing—None.

This has been found to require about 20 lb. of meat meal per pig in growing from about 50 to 200 lb. liveweight, the daily intake being from 3 to 4 oz. per day.

3. The meat meal may be fed as 5 per cent. of the ration throughout. This requires a little more meat meal than the preceding scheme.

4. Skim milk, ¾ gallon per pig per day, may be fed with the wheat which may be hand or self fed.

## May Be Fed to Cattle Mixed with Other Foods.

Wheat is best fed in a rolled, coarsely ground, or crushed state to cattle, as the finely ground wheat is less palatable and not so well utilised as a food. To avoid the trouble with cattle going off feed, which is sometimes encountered when feeding this grain, wheat should constitute not more than 50 per cent. of the concentrate ration for high-producing dairy cattle, but up to 75 per cent. or more may usually be fed with safety to cattle of only moderate milk production. Quantities up to 10 lb. per day may be fed in this way.

Bulky material such as crushed oats, bran, oaten or lucerne chaff and silage are suitable materials for mixing with the crushed wheat, and as the grain is low in protein, for milk production it should be balanced by feeding with some protein-rich food as good lucerne hay or chaff, which may supply sufficient protein for low-producing cattle, or some oil meal, as linseed, peanut or copra meals or meat meal, for cattle of higher production. The palatability of the crushed wheat is also increased by these feeds, and other grains, as crushed maize or barley, may also substitute some of the crushed wheat if it is found that the cattle are not taking to it too well.

In America wheat has been used for fattening store cattle and is found equal to maize. Quantities up to 20 lb. per day have been fed by careful methods, perhaps a month being spent in inducing cattle to take this amount. It was found better to mix the crushed wheat with some other grain as crushed barley or maize, and so reduce the likelihood of cattle going off their feed.

### Useful Feed for Sheep.

Fattening lambs and lambing ewes, the most difficult class of sheep to feed successfully, may be fed on wheat and lucerne chaff only, with excellent results. Up to I lb. of grain per day may be fed, the lucerne chaff remedying the deficiencies of the cereal grain, namely, protein, calcium, and Vitamin A. The grain is best fed whole to sheep as, although the food value is probably not reduced by grinding or crushing, the palatability is. If fairly heavy feeding of wheat is necessary and it is noticed that sheep are going off this feed, mixing the wheat with other grain as barley or maize will usually correct the trouble. For dry sheep with some roughage available, 4-5 ozs. of wheat per day is usually sufficient. Commence by feeding 11/2 ozs. per head for the first two days and then increase by 1/2 oz. per day till the full amount it is intended to feed is reached.

As with other cereal grains, dry ewes and wethers can do quite well on wheat and some roughage such as hay, straw, silage or paddock roughage, but milking ewes usually require some additional protein, as supplied by lucerne hay, oil meals or meat meal if the ewes are to have a plentiful supply of milk. Lucerne hay, if fed in sufficient amount, can correct the calcium deficiency of wheat, but if it is not available, I per cent. of ground limestone should be mixed with the grain, or equal parts ground limestone and salt (with molasses, if necessary, as an attraction) given as a lick.

Trailing of wheat is usually not as successful as trailing maize on account of the smallness of the grain and the consequent amount of sand that is picked up by the sheep, so that if possible the grain should be fed in troughs or self-feeders.

## Crush Coarsely with Bulky Concentrates for Horses.

For horses, wheat should be fed coarsely crushed with other bulky concentrates as bran or oats, but if care is taken in feeding, crushed wheat may be used as the only concentrate. Trials in America in which colts were fed only steam-rolled wheat and chaff, gave weight gains equal to those when colts were fed the usual ration of oats and chaff, and no digestive disturbances were experienced.

### Wheatmeal Can be Used for Poultry.

The acute shortage of bran and pollard, the by-products of the gristing of wheat for flour, has caused poultry owners much needless anxiety as to what can be used as substitutes for these mill offals, as wheat itself, which is in surplus supply as a result of the reduced manufacture of flour, when properly prepared in a balanced ration, can efficiently replace the bran and pollard. At Hawkesbury Agricultural College trials with wheatmeal in comparison with the standard bran and pollard ration showed that the egg production on a ration of 60 per cent. wheatmeal was better than that on the standard ration. The rations used were:--

	No. 1. (Standard)	No. 2.	No. 3.
	lb	lb.	lb.
Wheatmeal		50	60
Bran	34	221/2	32
Pollard	60	20	
Meat meal	6	71/2	8
Salt	1/2	11/2	11/2
with an after	rnoon feed	of tv	vo-thirds
wheat grain ar	id one-third	cracke	d maize.
	.1 .		

The group on the 60 per cent, wheatmeal ration laid significantly more eggs per year than either of the other groups.

These experiments, undertaken by Mr. Hadlington, Poultry Expert of the Department, indicated that the main disadvantages in using wheatmeal are that if the meal is too fine it tends to make a sticky mash, and if too coarse, the mash is too granular. If the mash is of suitable consistency, there is no trouble with the palatability of the feed.

### Wheatmeal.

The reduction in flour manufacture has caused flour millers to look for new avenues to which the mills may be turned, and a product which has lately appeared is a wheatmeal which is not a straight grist of wheat, but gristed wheat with a certain percentage of the flour extracted, so that much of the undesirably "gluey" property of moistened whole wheat meal is avoided. It is this

"gluey" property of whole wheat meal when moistened, that makes it necessary to only coarsely grind or to crush wheat for feeding to cattle, pigs and horses.

The analysis of a typical sample of this extracted wheatmeal, compared with the analysis of standard f.a.q. wheat is as

follows:—

Protein. Fat. Fibre. per cent. per cent. per cent. F.a.q wheat .. 13.4 1.75 2.1 Extracted wheatmeal .. 11.5 2 3

It is seen that there is little actual difference in the analyses of the wheat and the extracted wheatmeal, the most noticeable difference being that there is a slight increase in fibre, although this difference is so small to be overshadowed by the con-

The weight units in which the various feeds comparable to wheat are fed vary as follows:—Oats, 40 lb. per bushel; barley, 50 lb. per bushel; maize, 56 lb. per bushel; wheat, 60 lb. per bushel; pollard, 2,000 lb. per short ton; bran, 2,000 lb. per short ton; hay, 2,240 lb. per long ton.

The feeding value of these feeds also varies, the starch equivalent per 100 lb. being as follows:—Oats, 62; barley, 71; maize, 77; wheat, 72; pollard, 69; bran,

44; good oaten hay, 42.

It is thus seen that it is useless comparing bushel prices to estimate which is the cheapest feed.

The following table takes into account the weight unit and food value differences and gives the equivalent prices of the common feeds comparable to wheat.

Wheat (bus)	Wheat or Wheatmeal (2,000 lb).	Maize (bus.).	Barley (bus ).	Oats (bus.).	Pollard (2,000 lb)	Bran (2,000 lb )	Good Oaten Hay (1 cwt)
s d. 2 o 2 b 3 o 3 6 4 o 4 6	£ s d 3 7 0 4 3 0 5 0 0 5 16 0 6 13 0 7 10 0	s d. 2 o 2 b 3 o 3 6 4 o 4 6	5 d 1 8 2 1 2 6 2 11 3 4 3 9	5. d 1 1½ 1 5 1 8½ 2 0 2 3½ 2 7	£ S d. 3 4 0 4 0 0 4 16 0 5 13 0 6 8 0 7 4 0	f s d. 2 0 0 2 10 0 3 1 0 3 11 0 4 1 0 4 11 0	5 d 2 2 2 2 9 3 4 3 10 4 5 4 11

sideration that individual samples of wheat may vary in fibre content from 1.8 to 3.5 per cent. Protein content also can vary from 8 to 16 per cent., depending on the hardness of the wheat.

It is known that cattle and poultry can be successfully fed with this type of meal, and probably there would be no trouble with pigs or horses. The recommendations for the feeding of wheat apply also to this wheatmeal

## The Economics of Wheat and Wheatmeal Feeding.

All attempts at efficient feeding of stock must be brought to an economic as well as a nutritional basis, i.e., it cannot be considered that stock are being fed efficiently unless they are receiving a ration which is adequate in food matter for the particular purposes for which the stock are being fed, and which is compounded so that its total cost is the least amount possible. To this end it will pay stockowners to consider the feeding of wheat and wheatmeal in the light of a little economics.

It can be seen that if wheat is available at 3s. per bushel, barley will be a cheaper feed while it is less than 2s. 6d., and a dearer feed above this price. If wheat meal is available at £7 10s. per short ton, pollard will be cheaper if less than £7 4s. per short ton, and bran dearer if more than £4 11s. per short ton.

It will be noticed that hay at over 4s. 11d. per cwt. is dearer than wheat at 4s. 6d. per bushel, i.e., that on a food unit basis hay is practically always dearer than the grains. This is a condition peculiar to Australia, as in most other countries the position is reversed, the concentrates being the dearer food on the food unit basis.

Too much reliance should not be placed on these figures, as they are only approximations and do not take into account palatability, ease of digestion or particular values, as oats has in horse rations or bran in dairy rations, but if used intelligently they will enable a stock feeder to determine the cheaper feed, and in particular note that at present prices wheat is a most economical

feedstuff.

### A SIDE-DELIVERY MOWER RAKE.

## Easily Made and Attached.

SAVES LABOUR WHEN MOWING GREEN FODDER.

J. A. WILLIAMSON, H.D.A., Farm Manager, Hawkesbury Agricultural College.

IN these days of shortage of labour on the farm, anything that tends to increase the efficiency of available labour or reduce the amount of work necessary in the production and handling of a crop, is particularly valuable.

For that reason farmers who have crops to cut for green feed or for silage, will be interested in a mower rake attachment designed, made and proved efficient at Hawkesbury Agricultural College, as a means of raking greenstuff into windrows at the same time as the crop is mown, thus saving the time and labour usually required for unhitching the team from the mower, hitching the animals to the rake and going over the ground for the second time.

The attachment consists of a series of curved fingers riveted to a plate which is

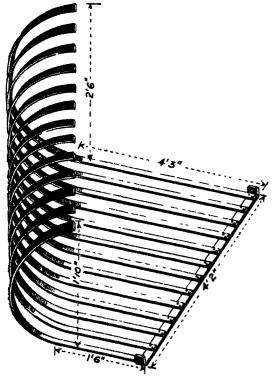


Diagram Showing Construction of the Mower Rake,



The Mower Rake at Work in a Crop. Note the compact windrow and the clean track.

bolted to the outer bar of the mower (see diagram). It can be made by a blacksmith or by a handyman in a day and requires no more than 3 cwt. of mild steel. The cost 1s approximately 15s for the steel, and, say, 25s, for the blacksmith, or a total of £2.

The plate is made of 2 inch  $x \frac{1}{4}$  inch mild steel and is 4 feet 2 inches long for 4 feet 6 inch mowers, and 4 feet 9 inches long for 5 feet mowers. The curved fingers are of 1 inch by 1/4 inch mild steel and are riveted to this plate, being set 4 inches apart; in addition to being curved, the free end of each finger is given a 4-inch inward twist toward the mower. Each finger is made 6 inches longer than the previous finger, so that with the first or cut finger 3 feet 10 inches long, then the thirteenth or last finger, on a 4 feet 6 inch mower is 8 feet long. To give a gradual increase in length to the table formed by the fingers. the table is made 1 foot 6 inches wide at the crop end of the cutter bar, and 4 feet 3 inches at the mower end. Similarly the height of the rake attachment is gradually increased from 1 foot 10 inches at the crop side to 2 feet 6 inches at the mower side.

All makes of mowers have two bolt slots or clips at the rear of each end of the knife or cutter bar, for attaching a reaper table. By turning the rake main plate up at each end and boring for a bolt, it is a simple matter to attach the rake to any mower.



The Mower Rake Attachment in Position, Ready for Use.

### Using the Attachment.

The actual raking is done through the resistance of the stubble, which causes the cut crop to be brought to the back of the take fingers. The curved and twisted portion of the fingers causes the crop to be thrown further forward and along the rake table; the cut material is then brought back again to the curved sections, again thrown forward and along, until the final fingers are reached when the crop is rolled into a windrow in line with the track of the mower. The windrow formed by this attachment is fairly compact, with the fodder well rolled so that rain is shed better than with the usual type of windrow. The attachment leaves a clear track for the next round of the mower.



The Attachment is Portable With the Mower.

The fingers are only fastened to the main plate by two rivets each finger, for it is essential that the fingers be free and springy, as this helps to throw the cut fodder along the rake table. No supporting stays should be used, as any tightening or rigidity will defeat the purpose for which the attachment is required.

When using the rake attachment care should be taken that the mower knife is set with the proper lead, usually 1½ inches forward for 4 feet 6 inch mowers and 1½ inches for 5 feet mowers. This will prevent drag and also side draught. The fitting of this rake does not in any way interfere with the mobility of the mower.



The Mower, Without Rake Attachment, Being Used in the Crop. The cut material left behind the mower has still to be raked

### A Variety of Uses.

Such an attachment should be of value, not only for cutting green fodder crops, but also for such silage crops as wheat, oats and barley. At Hawkesbury Agricultural College it was found satisfactory for harvesting light crops of oats and wheat for hay baling, the windrows being ideal for handling with the sweep and tumble rakes. The dairy farmer and small farmer whose main labour is gone, and who has green fodder to cut daily and cart to livestock, should find the attachment very useful. While satisfactory for all green fodder crops, it is not advisable to use the rake if cutting a dense crop of lucerne for hay, as the fodder would be liable to sweat in the compact windrows.

## Copra for Sheep.

### Useful if Fed as Recommended.

### Good Supplementary Feed for Pigs.

J ROPERT, B.V.Sc., and W. L. HINDMARSH, B V.Sc., M.R.C.V.S.

DURING the past dry seasons the shortage and high prices of stock fodders have led graziers to seek substitute foods which could be obtained at reasonable prices. Among the foods used by sheep farmers was copra, of which, owing to war conditions, large supplies were available. Copra is the dried kernel of the cocoanut, and the oil which can be extracted from it has many industrial uses. After the oil has been removed the residue is used as a stock food and is sold as cocoanut meal. It is emphasised that the subject matter of this paper refers to copra itself and not to cocoanut meal or any other by-product obtained after processing.

Copra has been used with success as a supplementary food by a number of graziers, although some stated that their sheep did not take to it very readily. Owing to its high oil content it is not easy to grind, but this difficulty is overcome in some cases by grinding it mixed with other foodstuffs such as oats. Oats were especially suitable because of the fibre content which took up much of the oil expressed from the copra in the mill.

### Rations Containing Copra.

A meal made to the following formula was used successfully by one grazier, who gave it to the ewes, and even to lambs four weeks old which had been taken from their mothers.

Copra, 20 per cent. Wheat, 40 per cent. Blood meal, 10 per cent. Linseed meal, 5 per cent. Salt, 25 per cent.

Another grazier made a meal of the following composition:—

Copra meal, 30 per cent. Wheat, 30 per cent. Blood meal, 10 per cent. Salt, 19 per cent. Carbonate of lime, 10 per cent.

This was fed to 9,000 ewes at the rate of 8 ounces per head per day. He stated: "We found the copra meal to be very good food

and I think the best we have ever had. Our sheep still look surprisingly well, which we think is due to the copra mixture."

Another mixture claimed to have been fed with good results was:—

Copra.  $2\frac{1}{2}$  oz. per sheep per day. Wheat,  $2\frac{1}{2}$  oz. per sheep per day. Salt,  $2\frac{1}{2}$  oz. per sheep per day.

It will be noticed that in the examples quoted above the copra was fed mixed with other food materials, and that it did not exceed one-third of the total ration. Even under these conditions some field observations indicate that sheep may tire of mixtures containing copra after eight or ten weeks feeding. When, however, this concentrate is fed alone, or forms the greater portion of the ration, serious losses may be caused, as the following example will show.

#### Excessive Amounts Harmful.

About 8,000 sheep had been hand fed with varying amounts of maize, proprietary nuts and cereal hay. In addition to other food, copra was given to 1,200 of these sheep at the rate of 2 ounces per sheep per day. After two days the ration of copra was increased to 4 ounces per day. On the next day a number of sheep were found sick or dead. It will be noted that the deaths occurred after giving of copra in the amount of 8 ounces in three days. A disadvantage of feeding sheep by scattering food on the ground is that the stronger sheep eat more

of the ration than the weaker animals, and it is probable that many sheep took much more than 8 ounces in the period of feeding. A few cattle also were given copra, and of these one died and one became sick but recovered.

The symptoms were not distinctive. The sheep lacked appetite and were depressed. A few had diarrhoea.

### Ill-effects Confirmed by Experiment.

On receipt of this report experiments were carried out at the Veterinary Research Station, Glenfield, to test the effect of copra on sheep. It was found that the animals would not eat copra readily. This was probably because our sheep were not accustomed to eating various drought foods, whereas in the drought stricken areas the sheep had learned to eat any concentrates put out.

The copra was therefore grated and given as a drench. It was found that after the administration of the copra the sheep refused to eat any food at all. They became depressed and lethargic. The dung became very soft and was covered with mucus. After medical treatment sheep recovered when placed on grassed paddocks, but otherwise death occurred. On postmortem examination the paunch was found to be full of food, although the sheep had eaten nothing since the copra was given. It seemed, therefore, that the copra had the effect of preventing the passage of food from the paunch to the other stomachs and bowels.

Copra has a very high oil content and it was decided to find if the ill-effect was due to cocoanut oil.

Sheep were, therefore, drenched with cocoanut oil in amounts approximately equal to that contained in the ration of copra. It was found that the oil produced effects similar to those caused by the copra. It was also found that small amounts of oil given daily led to the same result as the administration of one larger dose.

Other oils such as cottonseed oil, peanut oil and liquid paraffin produced no ill-effects.

### Copra for Pigs.

In parts of America and the Pacific Islands copra has been reported to provide an excellent concentrate for pigs. It has been tested in New Zealand and reported upon favourably. The usual recommendation is that the copra ration should not exceed one pound per day for pigs over 100 pounds hive weight and half a pound per day for lighter pigs. It is looked upon as a satisfactory supplement to feed with skim milk and whey.

Copra from the same supply as that which caused ill-health in sheep was fed to two pigs at the Glenfield Research Station. A ten-weeks-old pig ate half a pound daily for nine days and a large sow ate 21 pounds in seven days without showing any ill effect.

### Summary.

Whilst reports indicate that copra may be used as a supplementary food for sheep, it should not be fed alone but mixed with other fodders, and it should not comprise more than 30 per cent. of the mixture. If these precautions are not taken, ill-health and mortality may result. The harmful properties seem to be associated with the oil.

Copra is reported to have been used successfully in other countries in the feeding of pigs, and is said to be a good supplement to feed with skim milk and whey. Feeding trials with two pigs did not disclose any harmful properties to these animals.

### Acknowledgment.

We are indebted to Dr M C. Franklin, of the MacMaster Animal Health Laboratory, for much of the information regarding the successful use of copra in the field.



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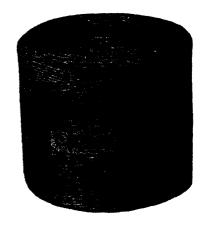
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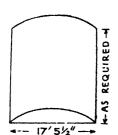
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## The Growing of Spinach Beet.

A. C. ORMAN, II.D.A., Senior Agricultural Instructor.

SPINACH beet, also known as silver beet or chard, ranks high amongst vegetables from the standpoint of food value. It is now used for canning as well as for marketing. Much of its Vitamin C content is lost when canned.

This vegetable may be successfully grown on a wide range of soil, although best results are obtained on deep, friable soils, such as alluvials and sandy loams. As with all other vegetable crops it is essential that the soil be thoroughly prepared and in a moist condition at sowing time.

#### Cultural Methods.

Spinach beet may be sown in frost-free coastal districts during most months of the year, but in most other districts which are subject to frost, sowing is usually carried out from July until early March. In the tableland districts the sowing period is restricted to the spring and summer months.

The seed is usually sown direct in the field, and the plants thinned out after they are well established. In the metropolitan area it is usual to sow in rows 15 inches apart with a spacing of 12 inches between the plants in the rows. In large scale production the seed should be sown in rows 2 feet to 2½ feet apart, and the plants thinned to 1 foot apart in the rows. Spinach plants may also be raised in seed beds and later transplanted to the field. The rate of sowing varies from 6 to 8 lb. per acre, depending on the method adopted in growing the crop. In the metropolitan area it is usual to sow spinach beet in beds so as to facilitate handling and cultivating the crop, and provide drainage.

The most suitable fertiliser to apply is three parts superphosphate and one part sulphate of ammonia at seeding time at the rate of 6 cwt per acre. Blood and bone may be added to the above mixture in the proportion of two parts, particularly on the sandy soils. As a top-dressing sulphate of ammonia at the rate of 1 cwt. per acre at each application, or poultry manure, may be applied between the rows and worked into the soil during the growth of the crop. It is important that the crop be kept growing continuously in order to obtain the best quality product.

### Picking and Marketing.

Spinach beet requires two to two and a half months in which to mature—and under some conditions a period of three months. The crop is ready to harvest as soon as the leaves are well developed and several pullings may be made during the one season, or the whole plant harvested It is usual to market spinach beet in bundles weighing 3 to 4 lb. Before bundling the leaves should be washed, particularly if grown on sandy soil, and the bundles should be trimmed before they are marketed.



Spinach, or Silver Beet, Growing Among Tomato Plants.

### Varieties.

There are three main varieties. Fordhook Giant, which is a large growing variety, having crumpled leaves of a dark green colour, is used both for canning and marketing. Dark Green Broad-ribbed has foliage which is dark green in colour and smooth, and the leaf stems or petioles are very broad: this variety is popular with metropolitan market gardeners. Lucullus has foliage of a light green colour and much crumpled; it is mostly grown by home gardeners and is not a popular market variety, although of very good quality.

### The Growing of Spinach Beet Seed.

No serious attempt has been made to produce spinach beet seed commercially in Australia. Apart from the work carried out by one or two seed firms, practically all our requirements have been imported from U.S.A. There seems no reason why seed of this popular vegetable could not be successfully raised in this country, provided the correct technique is followed and the crop is grown in suitable districts.

Generally speaking, best results might be expected in relatively cool localities where there is an absence of heavy rain during the summer months; heavy dews and excessive rain occurring during the seed ripening period seriously affect the quality of the seed. Districts such as the Murrumbidgee Irrigation Area, Bathurst, Gundagai and Goulburn are considered suitable. Parts of Tasmania have proved to be quite suitable for the growing of beet seed.

### The Conditions Required.

The seed crop should be grown on new land or land that has not previously grown beet, and

rrigation should also be available.

As spinach will cross readily with related plants such as red beet, sugar beet and mangolds, a site should be selected at least half a mile from any of these crops, as well as other varieties of silver beet. It is important that the crop be well supplied with moisture during the seeding period.

#### Sowing.

Seed should be sown in rows 2½ to 3 feet apart at the rate of 6 lb per acre, and the plants should be thinned to 1 foot apart in the rows once they have become established. To obtain the best results sowing should be carried out in January or February so that the plants will be well established before the winter.

When the plants have reached the marketable size they should be carefully inspected and all off-type plants as well as those showing disease should be removed. The plants retained for seed production should be vigorous, typical of the variety, of good quality, uniform and free from disease.

### Harvesting.

The usual method is to harvest when approximately two-thirds of the crop is ripe and the seed clusters well formed. The plants are cut with a sickle, tied in bundles and stooked in the field until thoroughly cured. They are then carted off and stacked under cover. The seed may be threshed with a flail or proper seed thresher, and finally cleaned with a winnower.

A good average yield of spinach beet seed is 500 lb. per acre, although higher yields are possible.

## Warning to Onion Growers.

### Danger of "Smut" in New Zealand Shipments.

THERE is danger of the introduction of the serious "smut" disease of onions in shipments which are arriving from New Zealand for military and civil consumption, points out Dr. C. J. Magee, Acting Chief Biologist, who warns growers that on no account should these onions be planted for the production of seed.

The "smut" disease has not become established in New South Wales, but is present in parts of New Zealand, and it is inevitable that, with large shipments, despite careful examination, some bulbs which have become contaminated either in the field or in the bags, will escape detection and exclusion

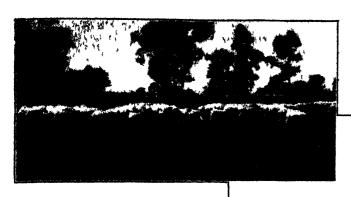
The "smut" fungus is capable of attacking the onion seedling from the time of germination until it is about three weeks old, and under conditions favourable to the disease it causes a very high mortality. Once introduced into the soil the disease will persist for many years. The need for care in the handling of imported bulbs is therefore plain.

Arrangements are being made with the New Zealand Government for measures to be taken to reduce to a minimum the chances of "smut" infected onions being included in consignments.

War Gossip is Dangerous.

Guard Your Tongue.





## The Chemical Composition

### Of Pasture

### As Related to Animal Nutrition.

(Continued from page 207.)

1 W MILES, BSc, ASTC, Chemists' Branch

THIS is the second portion of this article and it deals with the amount of the constituents of pasture required by grazing animals for growth, maintenance, fattening and milk production; and with the effects of deficiencies of these nutrients.

It has been pointed out earlier in this article that the grazing animal needs carbohydrate, fat and fibre for energy and for the formation of body fat; protein for tissue building; and nimeral matter for bone production and other purposes. However, these nutrients are required in different proportions according to the kind of animal and the stage of its development. A young growing calf for instance requires much protein for the growth of its muscles, internal organs, etc, whilst a full-grown sheep, with muscles and other tissues already fully formed, requires only the small amount necessary for their maintenance. A fattening steer, on the other hand, should receive a diet high in carbohydrate and fat.

By means of a large number of trials carried out in different parts of the world, nutrition experts have been able to calculate the daily amounts of digestible protein and of energy required by different animals. Some typical results are shown in Table 1.

TABLE 1.—Protein and Energy Requirements, per Head (Daily).

	Digestible Protein Required	Energy	Nutritive Ratio
Growing beef cattle (450 lb live	1b	Units (therms)	
weight) Growing dairy cattle (100 lb	1 25	57	1 65
live weight) Mature sheep (120 lb live	08	5 I	1 65
weight) Growing lamb (mutton breed.	0 07	0 9	1 85
40 lb live weight) Dairy cow (800 lb live weight, producing 2 gal of milk with	0 22	08	1 60
5 per cent. butter-fat content) Dry cow (800 lb live weight)		11 2 5 0	1 60 1 60

The above table provides a striking illustration of the high nutrient requirements of growing animals and of milking cows. Thus a growing lamb requires three times the amount of digestible protein and about the same amount of nett energy as a mature sheep three times its own weight; whilst a milking cow requires about twice the amount of nett energy and three times the amount of digestible protein that it does when dry.

The amounts of digestible protein and nett energy contained in some typical feeding stuffs are shown in Table 2.

The nett energy available to an animal from any feeding stuff is the total energy supplied by the digestible carbohydrate, fibre

and fat, minus the energy which the animal uses in mastication and digestion of the food. It may be seen from the table below that bluegrass, which is a good grass comparable with many of the better grasses grown in Australia, supplies more digestible protein and more energy units per 100 lb. dry matter than does oaten or lucerne hay. In very low grade materials such as buckwheat hulls, the energy required for mastication and digestion is greater than that obtained from the digested material, so that after eating 100 lb. of such material the animal would show a loss of 7.7 energy units. Wheat straw is little better, 70 lb. being required to supply the daily amount of digestible protein for a 40 lb. lamb. Such low grade materials are characterised by a high percentage of indigestible fibre.

TABLE 2 — Digestible Protein and Nett Energy in Typical Feeding-stuffs.

	Digestable True Protein per 100 lb.	Nett Energy per 100 lb.
	, Ib	Units
Oats (grain	87	(th: rms) 67 b
Wheat (grain)	77	or 6
Bran	108	5.3
Oaten hav	3 9	3-3
I ucerne hay	7 1	34 -
Bluegrass (70 per cent, moisture)	2.8	14 9
Bluegrass (calculated on 100 lb dry	ı İ	
matter)	93	493
Whe it straw	03	7 2
Buckwheat hulls	'	77

When the amounts of digestible protein and nett energy required daily by different classes of animals, and the amounts available in different feeding stuffs are known, it is possible to calculate rations for the economical feeding of livestock.

### The Nutritive Ratio.

In the case of livestock maintained wholly or mainly on pasture, such feeding standards have no practical use, for the total amount of pasture eaten daily cannot be regulated. The problem is, however, approached in another way, and we look for a pasture of such composition that the amounts of digestible protein and of nett energy available from it are in the same relative proportions as the amounts of digestible protein and of energy required by the particular animal.

The relation between the amount of digestible protein and the nett energy is

expressed in the nutritive ratio, which is the ratio between the digestible protein, expressed as unity, to the sum of the energysupplying digestible carbohydrate, digestible fibre and digestible fat, the latter being multiplied by 2.25. Thus the first term is always one, and the second term of the ratio is calculated as follows:—

(Digestible fat × 2 25) + digestible carbohydrate + diges tible fibre digestible protein.

Table I gives estimated ideal nutritive ratios of feed for different classes of live-stock.



The Animal shown above received no Naturally Occurring Foodstuff from Weaning to Maturity

The diet during this period consisted wholly of purified chimical substances

[After Maynard]

### Effects of Deficiency.

Where the amounts of digestible protein or nett energy available to the animal are very much lower than the amounts set out in Table 2, all classes of animal will rapidly lose body weight and eventually die from starvation The feed rarely reaches this low level except in time of drought when the condition of the stock and the pastures as they deteriorate, are noticed by the stockman, who then applies whatever remedial measures he can. However, less acute deficiencies frequently occur and may pass unnoticed, thus leading to unsuspected economic loss. In dairy cows, the effects of such minor deficiency are not usually shown in a drop in milk production immediately, since the animal, rather than reduce the milk

supply, will draw on the tissues of its body to produce the protein, fat and milk sugar necessary. Once these bodily reserves have been depleted the drop in milk production is likely to be severe. Hence a dairy cow must be kept in good condition right up to calving, and this condition must be maintained throughout the entire lactation period.

In all classes of growing livestock, lower levels of protein and energy supply may still be sufficient for growth, but this growth will be slower than with adequate nutrition, and lower financial returns are likely to be obtained. In beef and lamb production, slower growth means a longer time before animals of a particular size can be marketed, and during this time the capital which might have been realized is tied up; moreover the premium for prime animals is likely to be lost. In addition, animals growing slowly require more total feed to reach a given body weight than those growing quickly.

### Mineral Requirements.

In the first portion of this article it was pointed out that lime and phosphoric acid are necessary for bone formation, that they enter into the composition of the milk and are necessary for certain other hodily functions. However, the lime and phosphoric acid requirements of different classes of live-tock vary. The dairy cow makes a high demand on these minerals in the feed. for in addition to its own bodily requirements, it has to supply lime and phosphoric acid for the bones of its unborn calf and a further large amount in its milk. Experiments suggest that 0.4 per cent. of lime and about 0.5 per cent. of phosphoric acid in the dry matter of the feed is sufficient for the cow. If the amount of these minerals in the feed is not sufficient to supply requirements for the milk and for the unborn calf, the cow will supply the additional amount necessary from the lime and phosphoric acid in her own bones. With rations which are extremely low in either of the minerals, the bones may be so depleted as to break at the slightest blow. In less acute cases the bones become weaker from one lactation to the next, milk production drops, and the productive life of the animal is shortened.

In South Africa an experiment showed that cows on a mineral-deficient pasture produced 40 per cent. less milk than when adequate lime and phosphoric acid was supplied. In Minnesota, a similar experiment showed a 50-146 per cent. increase in milk production when these minerals were added to the diet.

Reproduction, too, is affected by deficiency of the above minerals. In a South African experiment the calf crop was about 80 per cent. in a group of animals receiving adequate mineral nutrition, whilst it was only 51 per cent. in animals suffering from deficiency of phosphoric acid.

Growing animals require liberal amounts of lime and phosphoric acid in the diet for the formation of their rapidly growing bone structure. Nursing young never suffer from a deficiency of lime or phosphoric acid because there is a liberal supply in the milk. The same applies to the dairy calf receiving skim milk. However, once the milk is withdrawn the young animal, if on deficient pasture, may suffer from rickets; growth may also be retarded. The growing calf appears to require a higher percentage of lime and phosphoric acid in its feed than the lamb. The figures in Table 3 represent the amounts of these minerals which should be adequate for the nutrition of the young animal.

TABLE 3.

Percentage Amounts of Lime and Phosphoric Acid
in Dry Matter of Feed.

		I time (CaO)	Phosphoric Acid (PgO <sub>8</sub> )
Calf (at weaning Calf (full grown Lamb (at weani I amb (full grow	ng)	Per ceut 0	Per cent 0 6 0 4 0 5 0 1

The above figures are suggested as a guide and not an absolute standard, since lower amounts than those shown above may, under favourable circumstances, be sufficient.

Mild deficiency in lime and phosphoric acid may, in a similar way to mild deficiencies in nett energy and digestible protein supply, cause economic loss through retarded growth and reduced milk production without the appearance of any pronounced symptoms in the animal. Hence it must be emphasised that it is a paying proposition to maintain the food supply of farm animals at such a standard as to be certain that they are being adequately nourished.

(To be continued.)

## Approved Seed.

### June, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department has decided to publish each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied

regarding it to inquirers.

#### Wheat.

Bencubbin-Manager, Wagga Experiment Farm, Bomen (5s. 6d. bushel, f.o.r.)

Dundee-Manager, Wagga Experiment Farm, Bomen (5s 6d. bushel, f.or.).

Ghurka—Manager, Wagga Experiment Farm,
Bomen (5s. 6d. bushel, f.o.r.).
Ranee—Manager, Wagga Experiment Farm,
Bomen (5s. 6d. bushel, f.o.r.).

Totadgin-Manager, Experiment Farm, Tran-

gie. (5s. 6d. bushel, f.o.r.). Waratah—Manager, Wagga Experiment Farm, Bomen (5s. 6d bushel, f.o.r.).

Belar-Manager, Experiment Farm, Trangie. (4s. 6d. bushel, f.o.r.)

Gidgee-Manager, Experiment Farm, Trangie. (4s. 6d. bushel, f.o.r.)

Fulghum-Manager, Experiment Farm, Trangie. (4s. 6d. bushel, f.o.r.).

### Cauliflower.

Shorts-H. Burton Bradley, Sherwood Farm, Moorland.

#### Tomatoes.

Bonny Best — Manager, Experiment Farm, Bathurst. (4s. oz. posted.)

Marvana - Rumseys Seeds Pty Ltd., 331 Church-street, Parramatta.

Break-o'-Day-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Australian Earliana-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rouge de Marmande-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

### Reans.

Tweed Wonder-H. P. Richards, "Sovereignton," Tenterfield.

### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recom-mended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:-Wheat-

Bencubbin, Ford, Eureka, Eureka 2, Bordan. Waratah.

Oats-Belar.

Cauliflowers-

Hawkesbury Solid White, Nugget, Shorts.

Australian Earliana, Bonny Best, Improved Walker's Recruit, Red Marhio, Salad's Special.

Onions-

Hunter River Brown, Maitland White.

Pumpkins-

Qucensland Blue.

Beans-

Tweed Wonder, Brown Beauty.

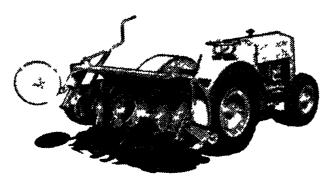
Phalaris tuberosa, Subterranean Clover (midseason), Sudan Grass, Lucerne.

### Agricultural Societies' Shows.

SECRETARIES are invited to forward for insertion in this list dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Box 36A, G.P.O., Sydney, not later than the 15th of the month previous to issue. Alterations of dates should be notified at once.

Peak Hill (L. H. Roache) Condobolin (N. J. Hanlen) Bogan Gate (J. T. aBeckett) Trundle (W. A. Long)	Aug. 4, 5.	Tullamore (W. J. Colville) Parkes (L. S. Seaborn) Forbes (W. D. Roberts)	,, 24, 25, 26.
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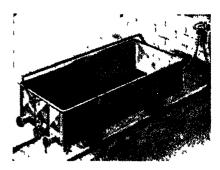
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Davis Gelatine (Australia) Pty Ltd G.P.O. Box 3583 S, Sydney, N.S.W.

## An Intelligent Farmer . . .

. . . . would not keep a horse tied to a fence when it could be usefully employed elsewhere.

The Department of Railways does not employ equine transport. In its important and extensive operations trucks are the equivalent of horses on the farm.



Every truck delayed unnecessarily in loading or unloading reduces the carrying power of the railways, in other words, reduces the efficiency of the indispensable service the railways must give to the Nation in war time.

Transport inefficiency adversely affects primary producers in common with every other group in the community.

The truck user's duty to himself and his country is plain—

LOAD AND UNLOAD TRUCKS PROMPTLY.

S. R. NICHOLAS, Acting Secretary for Railways.

### BLACKSMITHING ON THE FARM.

## With Hints on Welding and Tempering.

(Concluded from page 224.)

L. J. KEMP, Overseer of Blacksmithing, Parramatta Gaol.

THIS article, which commenced in the April issue, should assist the farmer to do some of the maintenance and repair work with iron and tools, which it may be difficult to have carried out by tradesmen in these days of labour shortage. The previous sections of the article dealt with the tools and equipment required, and with forging and welding. This concluding section deals with the tempering of cast steel.

### TEMPERING.

It will be noticed that the word "iron" has been used frequently in these notes. Technically this is not quite correct, as iron has now been replaced by the commercial product known as "mild steel." It was considered advisable, however, to use the older and better-known name, so that confusion would be avoided when the learner read this matter on tempering of steel.

The explanation is that it is possible to harden mild steel— that is, to "case harden" to prevent excessive wear in moving parts—but it is not possible to harden and temper it to hold a cutting edge or point when applied to hard materials; the "carbon" content of mild steel is too low to permit of this. Cast (tool-steel) can be hardened and tempered provided that the work is done in the proper manner.

The treatment and tempering of cast steel is a difficult matter to explain without the aid of a demonstration. Efforts have been made, however, to select the easiest methods, and to anticipate the difficulties which farmers with no experience, may encounter. The "tint" method of tempering described is selected as being the most simple to understand and effective in use. those learners who find that their efforts to temper tools end in failure, and those who have never attempted to temper tools, I suggest the method of tempering with a block of lead. Very good results can be expected if the instructions given are carefully carried out.

As tools are very important to the farmer, it is to his advantage if he is able to recondition them when necessary. Tools such as

mattocks, picks, axes, etc., can be successfully drawn down, sharpened and retempered if sufficient care is exercised in the operation, as the forging of cast steel is very different to that of iron. It is emphasised that great care must be taken in the individual treatment of each tool, if dependable results are to be expected.

### The "Tint" Method.

The following manner is recommended for drawing down and retempering a steel pick. Place the tool in a forge fire, and heat to a bright cherry red colour. Draw down (or forge) upon the anvil, the thick butty part of the tool, with the sledge hammer. (Fig. 4.) To temper, heat the tool point to a dull red colour, immerse in a tub of water to a depth of 1 inch, and move the tool to and fro so that it comes in contact with fresh areas of water. When the glow disappears from the point, plunge the tool bodily into the tub of water, then withdraw immediately. Clean (or brighten) the point of the tool with a piece of sandstone (or emery cloth), and watch very carefully for the temper or colour to appear.

By observation it will be noticed that the point is about the colour of a piece of window glass—and equally as hard. Then the colour—or temper—will appear, starting from the body of the tool and slowly creeping towards the point. The first colour visible will be a light straw—almost brown; this is followed by a purple tinge, then a purple blue. When the purple blue colour has definitely reached the point of the tool, quench out smartly in a tub of water. Different tempers are required for different

tools, but for picks (rock and mud) and mattocks, the purple blue temper should be sufficient to hold a reliable cutting edge or point.

Very often when heating a pick, the point will warm up much quicker than the body. This difficulty can be overcome by heating slowly, when a more general and saturated heat will be obtained. If, after tempering,



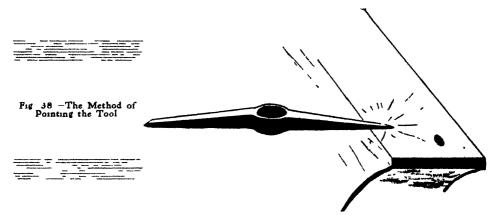
Fig 37 -Pick Before Drawing Down.

it is found that the point of the tool breaks when in use, the tool has been tempered too "hard," or it has been overheated during the process. When retempering such a pick make sure that a deeper blue colour is visible before quenching out in the watertub. Should the tool burr up when used, or perhaps bend when pressure is applied, then this is an indication that the temper

It is advisable to use charcoal for fuel when heating tools for tempering. Soft coke is useful, but as it contains certain impurities, its use should be restricted if charcoal is available. Hard or furnace coke is not recommended for heating tools, as it contains substances which will produce injurious effect upon the steel.

### The Changes That Occur.

It is necessary to impress upon the learner the necessity for carefully carrying out the above instructions if success in tempering his tools is to be expected. I do not propose to explain technically the changes that take place in the steel; it is sufficient to mention that the tool is hardened and tempered in the one operation by plunging the hot point in the tub of water. When the tool is withdrawn from the water and the point brightened so that temper or colour can be seen, there is sufficient heat in the body of the tool to expel, or drive along to the tool point, the correct temper or colour necessary to "clothe" or "armour" the tool to



is too "soft" Retemper and watch for purple blue colour which is harder. Mattocks, gads, adzes and spud bars are hardened and tempered in the same manner as picks.

### Ample Clean Water and a Good Fire.

When tempering tools, always have an ample supply of water in the tub—or any container used for the purpose. About 12 gallons should be sufficient for ordinary use. Always use fresh clear water. Soapy water is useless for tempering and disappointing results can be expected from its use.

maintain a cutting edge or point when applied to hard work. The final operation—quenching until cold in a tub of water—arrests the temper when the colour needed appears at the point of the tool

### To Anneal Cast Steel.

Frequently cast steel is referred to as "carbon steel" It may be necessary that the cast steel should be annealed or softened for the purpose of re-dressing and sharpening. To anneal cast steel, heat to a bright red colour, withdraw from the fire and allow to cool out very slowly, as it is of utmost

importance that cold air should be excluded from the steel during the process of annealing. The best method is to heat the steel to a bright red colour and then bury the tool in ashes. The rate of cooling is important. The slower the steel is cooled the softer the tool will be.

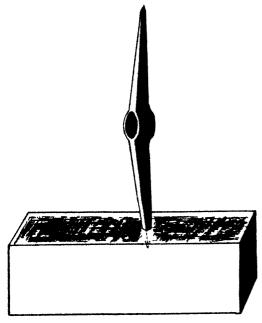


Fig. 39 .- Pick Inserted in Block of Lead

When heating steel for forging, tempering or annealing, always make sure that it is not over-heated. Never heat steel to a higher temperature than a bright red cherry colour. Cast steel that has been over-heated is of no further use, and attempts to retemper it fail. The treatment of steel is, of necessity, a slow procedure, but the operator will be well repaid if the tools give dependable service.

### Lead Tempering.

Tools such as mattocks, picks, spud bars, etc., can be successfully hardened and tempered by the method known as "lead tempering." It is not claimed that this method of steel treatment compares with the "tint" method that has been described, but its simplicity may appeal to those farmers who find some difficulty in putting into practice the art of tempering. It is submitted as a very fair substitute, and, if the instructions are followed implicitly, will give approximately the same results.

All that is required by way of equipment is a block of common lead, of a size of about 6 inches long, 4 inches wide and 2 inches thick.

The hardening and tempering of a rock pick by this method is carried out as follows:—

Heat the tool to a bright red colour, draw down the thick or butty part with the sledge hammer, then finish the point with the hand hammer. Allow the tool to cool out. When thoroughly cold make an impression (or punch a hole) in the block of lead with the pointed end of the pick to a depth of 1 inch. The easiest manner of doing this is to insert the handle in the pick, and then strike a hard blow at the block of lead, making an impression sufficient for the required. Remove the tool from the handle; reheat the point of pick to a dull red colour, and then place the hot end in the impression previously made in the lead block. Allow the tool to remain in the lead block until cold.

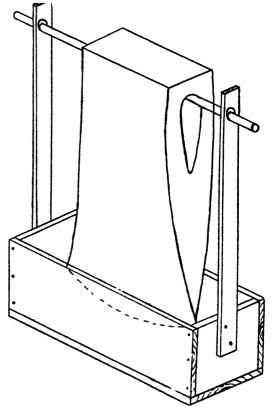


Fig. 40.—Box Mould, Showing Axe Suspended on Rod

The tool is now ready for use. Fig. 37 illustrates the pick before being drawn down, and Fig. 38 the method of pointing the tool. Fig. 39 shows the pick inserted in the block of lead. Care should be taken not to heat the tool above the dull red colour before it is placed in the block of lead. Be very careful to see that the tool is inserted in the impression so that it is a close and snug fit.

No difficulty will be found in drawing down and sharpening a mattock in the same manner as described for a rock pick. Heat the tool to a bright red colour; draw down with sledge hammer and then finish with hand hammer. While the tool is hot sharpen with a file. Allow to cool out then make an impression in the lead block. Re-heat to a duil red colour, place in the impression and allow to cool out.

Drawing down and tempering an axe is always a "stubborn" job, but no difficulty should be found if hardened and tempered by the lead method. Great care should be taken in heating axes, because the cutting edge of the tool is very likely to become overheated. Heat very carefully and draw down with hammer; file the cutting edge of tool while still hot, and then allow to cool out.

Some difficulty may be experienced in making an impression in the block of lead with an axe, but this can be overcome by making a mould box, as shown in Fig. 40. The box is very simple to make. It should be made of hardwood and of a size large enough to accommodate the tool when suspended within the box. A rod of iron supported by uprights is passed through the eye of the axe.

Melt a piece of lead in a ladle (or any old cast-iron pot) and pour into the mould box to a height level with the widest part of the axe. Allow the lead to set, and then withdraw the tool. Reheat the tool to a dull red colour, place again in the impression in the mould box and allow to remain until cold. It will be found that a good temper has been attained.

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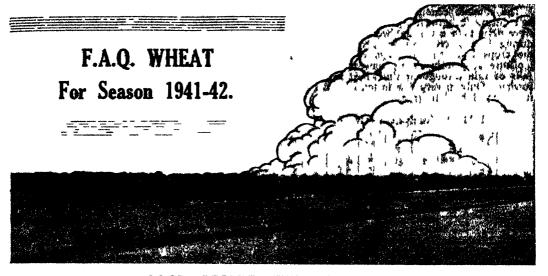
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### A GOOD, BRIGHT, WELL-FILLED GRAIN.

J R FISHER, B Sc Agi, H D A, Analyst.

THE general quality of New South Wales 1941-42 F.A.Q. wheat has been determined by milling tests, chemical analyses and farinograph, fermentograph and baking tests. The samples representative of the grain harvested were obtained by courtesy of the Sydney Chamber of Commerce.

The protein content of the F.A.Q. wheat is slightly lower than the previous year, and though the gluten content is basically similar, the gluten possesses slightly less

stability. Fermentograph tests show that the gassing power is low.

The wheat comprising the FAQ samples was taken from the three wheat growing areas of the State in the following proportion—

			Bulk Wheat.	Bagged Wheat
			Per cent	Per cent
Wheat	from	Northern areas	15	15
		Western areas.		50
Wheat	from	Southern areas	40	35

The grain was of good bright condition, and on the whole was well filled. There were very few punched grains in the samples, and no bleaching or weather damage was m evidence. The bulk sample contained a slightly higher percentage of vitreous grains than the bagged sample.

### Dockage.

The samples supplied to determine the weight of bulk wheat were mostly taken by hand from open bags and lorries, and included all material which was received. In the instance of bagged wheat, the samples were taken through a trier, and this method of sampling excludes some of the chaft, outs, straw, etc.

The assount of dockage as determined by means of a 2 mm slotted sieve is shown below —

	Total dockage including broken and pinched grain, wild and domestic cats, straw, weed seeds, dust etc	Broken and pinched whoat grain
	Per cent	Per cent
Bulk FAQ Bagged FAQ	5 9	5 4
Bagged FAQ	5 3	4.9

The total dockage for bulk wheat was much lower than for the 1040-41 season's bulk FAQ wheat. This reduction in dockage can be attributed to the definite effort made by the Manager of the Government Grain I levators to reduce the amount of non-millable material in bulk wheat, and thereby raise the general value of FAQ wheat, at the same time utilising the storage space available for millable grain only

The amount of dockage for the bagged FAQ sample also was lower than that for bagged wheat from the 1940-41 crop

In both bulk and bagged FAQ, samples the amount of actual rubbish was very small, by far the preater percentage of dockage consisting of broken and pinched grains. A certain proportion of this grain could be classed as millable wheat, and the remainder would have a definite value for feed purposes.

### Milling Results and Analytical Data on the Wheat.

The following tables set out analytical data relating to the grain and flour, farinograph and fermentograph data of the flour and baking results—

The figures set out in Tables 1 and 2 indicate that the general quality of the FAQ 15 slightly lower than that of the 1940-41 season

Bulk FAQ wheat from the 1941-42 harvest contains 0.9 per cent less protein than the 1940-41 bulk FAQ wheat, whilst the bagged sample contains 0.2 per cent. less protein than the bagged sample from the 1940-41 crop.

### THE AGRICULTURAL GAZETTE.]

The climatic conditions throughout the wheat belt during the growing period of the 1941 crop were drier than usual, but were not as severe as during the 1940 crop growing period; in addition, the crops had the advantage of ample subsoil moisture at planting time, consequent on heavy falls of rain throughout the wheat belt prior to sowing. Only in very few instances was harvesting delayed by late rains.

Table 1. Analysis of Grain.

Sample.	Declared bushel weight. Louis Schopper.	Bushel weight Clean wheat, Franklin,	Moisture.	Flour Yield.	Milling Quality.	Pelshenke Time.	Nitrogen.	Protein (N x 5.7).	
<b>T</b> . ().	lb.	Ib.	Per cent.	Per cent.	-	Min- utes,	Per cent.	Per cent.	
Bulk F.A.Q.	64	63	11.2	72·I	Ex- cell. Ex-	55	2.17	12:37	
Bagged F.A.Q.	64	631	11.0	71.8	cell.	53	2.16	12.31	

<sup>\*</sup> Includes 2.5 per cent of low grade flour which is not used in flour tests.

Table 2.—Analysis of Flour.

Sample.	Nitro-	Pro- tein (N x	Ash.	Gluten Content.		Gluten
•	•	5.7)		Quality.		
Bulk F.A.Q.	Per cent. 1.88	Per cent 10.72	Per cent. 0.44	Per cent. 36·2	Per cent.	Good to very good.
Bagged F.A.Q	1.87	10.66	0.44	35.7	11.4	Good to very good.
Bulk F.A.Q., 1940-41	2.04	11.63	0.43	40.6	13.1	Very good.

<sup>\*</sup> Results expressed on 13.5 per cent moisture basis.

Results of the Farinograph tests, which are set out in Table 3, give further evidence that the 1941-42 F.A.Q. wheat is slightly inferior in general quality to that of the 1940-41 season.

The Farinograph curves are of the same general type as those from the 1940-41 F.A.Q., indicating that, fundamentally, gluten quality is

similar to that of last season's wheat, but the curves show a slightly shorter dough development time and slightly greater amount of weakening after ten minutes. On the other hand, the Farinogram band is slightly wider than that of the 1040-41 samples, indicating greater gluten elasticity.

Table 3.-Farinograph Data.

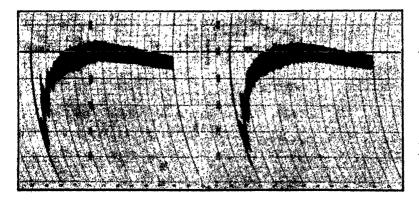
de la companya de la	1940-41	F.A.Q.	1941-42 F.A.Q.		
	Bulk.	Bagged.	Bulk.	Bagged.	
Absorption Dough Development time Dough stability Dough weakening in Bra- bender units in 10 mins. Width of band at optimum consistency	1 mins.	15 mins. 35 units	Per cent. 59:2 5 mins. 2 mins. 35 units 65 units	Per cent. 58.5 41 mins. 11 mins. 40 units 70 units	

Table 4.—Fermentograph Data.

	1940-41	F.A.Q.	1941-42 F.A.Q.		
	Bulk.	Bagged.	Bulk.	Bagged.	
	c.c.	c.c.	c.c.	c.c.	
Gas produced in 1st hour Gas produced in 2nd hour Gas produced in 3rd hour Gas produced in 4th hour	500 380	390 470 350 120	300 500 390 120	290 470 400 140	
Total	1,380	1,330	1,310	1,300	

Results of Fermentograph tests, set out in Table 4, show that the gassing power of the flour is similar to that of flour milled from 1940-41 F.A.Q. wheat, and millers and bakers are therefore advised to adopt similar practices to those employed during 1941 in respect to additions of malt flour.

The relatively low gassing power of the flour can undoubtedly be ascribed to the comparatively dry conditions under which the crops matured in the field; climatic conditions which favour the production of grain of high protein content and high gluten quality generally result in low diastatic activity and low gassing power.



Farinograms of 1941-42 F.A.Q. Whest. Left.—Bagged sample. Right.—Bulk sample.

Table 5 .- Baking Results.

Sample.	Water Ab- sorp- tion.	Loaf Vol- ume.	Sym- metry (Max. 10).	Crust color (Max. ro).	Crumb Tex- ture. (Max. 10).	Crumb color Max). zo).	Hand- ling Qual- ity.
- 11 - 7 - 0	Per cent.	c.c.					
Bulk F.A.Q. M.P Bulk F.A.Q.	57	600	81	84	81	9	Good
M.P.B Bagged F.A.	57	625	81	81	71	81	Good
Q., M.P Bagged F.A.	56	565	8	8	9	9	Good
Q., M.P.B.	56	610	8	81	81	9	Good

M.P. = Malt-phosphate procedure.
M.P.B. = Malt-phosphate-bromate procedure.

sample; this was to be expected as the bulk sample contained a slightly higher percentage of vitreous grain than the bagged sample.

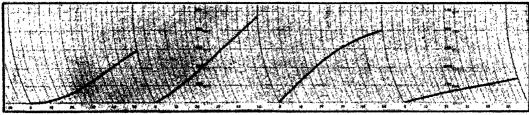
#### Summary,

The general quality of the 1041-42 F.A.Q. wheat has been determined by milling tests, chemical analysis and farinograph, fermentograph and baking tests.

The protein content of both bulk and bagged F.A.Q. wheat from the 1941-42 crop is slightly lower than that from the 1940-41 crop; the protein content was 0.9 per cent. lower in the instance of bulk F.A.Q. wheat, and 0.2 per cent. lower in the instance of the bagged sample.

Farinograph tests indicated that gluten quality was basically similar to that of 1940-41 F.A.Q.





Fermentograph Charts of 1941-42 F.A.Q. Wheat,

Above:—Bulk sample.

Below:—Bagged sample.

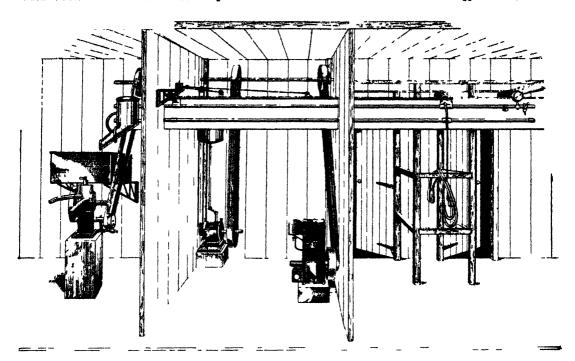
Both samples gave very satisfactory results in the baking tests, the results being comparable with those of the samples from the 1940-41 season's F.A.Q. The loaves were symmetrical in appearance and of large volume, with good crumb colour and crumb texture.

The baking quality of the bulk sample was slightly superior to that of the bagged F.A.Q.

wheat, although the gluten possesses slightly less stability. Fermentograph tests show that the gassing power of the flour is low, being comparable with that of flour milled from 1940-41 F.A.Q. wheat, and millers and bakers should therefore employ similar practices to those adopted during 1941 in respect to additions of malt flour.

### **GUARD YOUR TONGUE.**

You may pass on a minor piece of information that is harmless in itself, but linked with other pieces it forms a dangerous chain of rumour.



## Milking Machine Rubbers.

## Shortage of Supply Makes Care Essential.

A W. WAIKIR, Senior Dany Instructor

In the past Australia has been dependent upon Malaya and the Netherlands East Indies for practically all her raw rubber supplies. As a matter of fact, these countries produced in excess of 85 per cent. of the world's output. With their occupation by the Japanese it became apparent that whatever supplies were available in this country at the time would have to be carefully husbanded. Instructions were issued to the milking machine manufacturers to curtail severely their manufacture of rubber parts. To give effect to this instruction, and at the same time to maintain the efficiency of the machines, it is necessary to take such precautions as will ensure maximum life of all parts containing rubber until such time as the synthetic product is produced in large enough quantities to meet all demands, or until the rubber-producing countries are taken back from the invaders.

Milking machines depend for their efficiency on the use of rubber. The flexibility necessary in the inflations to provide the milking action would not be possible without its use, and rubber tubing is essential for certain sections of the plant to allow it to operate in the many different positions made necessary by the movement or the size of the cattle.

Large-scale dairy farming operations have made machine milking popular in this country. The acute shortage of manpower since the war commenced has further increased the use of machines. Unless, however, the greatest care is taken to ensure longer life for the various rubber parts it may happen that supplies of rubber, which have been reduced to 75 per cent. of last

year's requirements for milking machines, will become exhausted.

To appreciate fully the position it should be understood that fats and greases are the true enemies of rubber and cause the greatest deterioration. It should also be realised that milk obtained from the cow may average at least 4 per cent. butter-fat. This emphasises the importance of thorough washing in order to remove all milky matter, together with the butter-fat, from the tubes and inflations as soon as possible after the milking has been completed.



Picturesque South Coast Dairying Country.

### Thoroughly Cleanse Machines.

To extend the life of the rubber parts it is necessary to follow very carefully the cardinal rules employed in the cleansing of machines. These are set out below:—

First:—Run cold or lukewarm water through the machines, using I gallon to each set of cups. This will remove most of the particles of milk from the surface and prevent the cooking-on of milk solids when hot water is applied. Deposits formed by this

application of heat contain a proportion of fat that would not be liberated by subsequent washings.

Second:—Run boiling water, to which has been added one tablespoonful of caustic soda to every 4 gallons of water, through the machines again at the rate of I gallon of solution to each set of cups. Air should be allowed entrance intermittently to cause the solution to surge and thus improve the cleansing action. The outsides of the cups particularly and all sections where metal touches rubber, including the area touched by the ring holding the inflation in position, should be well brushed to remove any deposits. At this stage, whilst not of particular reference to the care of rubbers, it should be mentioned that the brush passes through the milk line.

Third:—Run plain boiling water through the machines to remove traces of caustic soda solution and to complete the sterilisation. It is of the utmost importance that the water should be boiling and not merely hot, as effective sterilisation will not be possible unless the water temperature is high enough to destroy all the bacteria throughout the machine system.

Fourth:—Disconnect claws and long milk rubbers and hang in a cool airy position away from the sunlight until the next milking. Give this treatment without fail night and morning, as even if neglected on only one occasion deterioration of the rubber surfaces is likely to commence.

### Completely Dismantle Every Week.

Once each week it will be necessary completely to dismantle the entire milking plant; a definite day should be set aside each week for this purpose. During this operation the rubber parts should be soaked in slightly stronger caustic solution than that used for the normal cleansing operations. After being left to soak for some hours they should be brushed, then dipped in a similar solution of boiling water for a few minutes (but not for a long period) and again rinsed in plain water or water treated with sodium hypochlorite.

It will be found that the main sections where deterioration of rubber is likely to occur are (1) where any metal, particularly the metal ring, touches the inflation; (2) where the short rubber touches the claw; (3) where the releaser flap is attached by a

screw to the metal; (4) any section where milk has been cooked-on. Should this happen, it may be removed by immersing in a  $\frac{7}{2}$  per cent. solution of tartaric acid.

#### Care of Unused Machines.

If it is found necessary temporarily to cease using the milking machines, the rubbers should be carefully cleansed as above, placed in a tin receptacle, covered with French chalk or lime and then sealed from the air and stored in as cool a place as possible.

In the past some users of milking machines had only one incentive to induce them to give any special care to machine rubbers—saving money for themselves. Now special attention to rubber parts should be regarded as of national importance, and any negligence might almost be regarded, in present circumstances, as a form of sabotage.

The observance of the few simple rules suggested will undoubtedly increase the useful life of rubbers and thus allow the industry to carry on and at the same time permit the reduction in rubber consumption insisted upon by the controlling authorities.

Finally, after the machine rubbers have outlived their usefulness send them to the salvage authorities, who are glad to receive old rubber of all kinds.

## Brucellosis-free Herd Scheme (Swine). LIST OF ACCREDITED HERDS.

THE following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the terting of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Registered
Adams, J. P., "Melton," Daysdale.
Allard, S. R., Cleobury Stud, Werombie Road, via Camden
Bathurst Experiment Farm, Bathurst.
Campbell, D., Hillangrove, "Wamberal," via Gosford.
Chapman, G. E. and Son, "Illabo Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Crott, F., Lugwardine, Kentucky.
Draper R. E., "Glengar," Capertee.
Bade, E. M., "Eade Vale," Eucharcena.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggerry, Water Lane, Rouse Hill.
Genge, J. I, "Springheld," Eugowra.
Grafton Experiment Farm, Grafton.
Graham, E. H. Kinilabah Stud, Wagga
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Pennant Hills.

Hennessey, J., Pacific Stud Piggery, Holgate.
Holland, A. L. Argonne, Tuhbul.
Liverpool State Hospital and Home, Liverpool.
Maybin, N. C., Towac, Orange.
Macarthur (John' Memorial Agricultural High School, Glenfield.
McCaughev Memorial Agricultural High School, Yanco
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F.. "Camelot," Pennth.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud" Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell,
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp. Mannus
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla
Bmu Plains Prison Farm, Emu Plains.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.
Masters and Upston, Whitmore Stud Farm, Wamberal, via
Gosford.

Morisset Mental Hospital, Morisset.
Oberon Prison Camp, Oberon.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V., Marata, Harrow Road, Glenfield.
Punnett, R. S., Brawlin.
Smith, C. W J., "Norbiton," Canadian Lead
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

War Secrets Spread Like a Bush Fire.

#### Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:-

Owner and Address.		Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
		1942.			7042
. I. Toohev, "Mandemar," Berrima	56	8 June.	The Sydney Church of England Grammar		1943.
idcombe State Hospital and Home		13 ,,	School, Moss Vale	55	6 Feb
. T. Reid, "Narrangullen," Yass		15 ,,	Tudor House School, Moss Vale	17	6,
fiss N. C. Brenan, Arrankamp, Bowral	23	15 ,,	Koyong School, Moss Vale	2	6 ,,
. H. Newman, "Bunnigalore," Belanglo, via		- "	New England Girls' Grammar School, Armidale	25	6 ,,
Sutton Forest	l ro	15 ,,	A. E. Stace, Taylor Street, Armidale	31	7
arrer Memorial Agricultural High School		- "	New England University College, Armidale	13	x Mar
Nemingha	27	17 ,,	A. C. O'Dea, Perry Street, Dundas	28	19 ,
arm Home for Boys, Mittagong	56	18 ,,	Trangie Experiment Farm, Trangie	138	19 ,,
L. L. Killen, "Pine Park," Mumbil	201	20 ,,	Emu Plains Prison Farm	100	20 ,,
i. M. Edwards, Uralla	5	22 ,,	Lunacy Department, Morisset Mental Hospital	80	25 ,,
3. N. Coote, Auburn Vale Road, Inverell	30	22 ,,	Berry Training Farm, Berry	114	2 Apr
I. East, Gum Flat Road, Inverell	41	22 ,,	R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	3 ,,
. D. Frater, Inverell	104	23 ,,	Liverpool State Hospital and Home	102	10 ,,
. Brownlow, Gol Gol	34	26 ,,	K. W. D. Humphries, "Karoola," Inverell	162	24 ,,
lew England Experiment Farm, Glen Inner			H. F. White, Bald Blair, Guyra (Aberdeen		
(Jerseys)	64	27	Angus)	137	26 ,,
unacy Department, Rydalmere Menta			F. C. Harcombe, Hillcrest Farm, Warialda		
Hospital	. 48	27 ,,	Road, Inverell	32	15 May
'. J. Wilks, "Oaks Farm," Muswellbrook V. Boland, "Seaton," Inverell	45	28 ,,	A. N. De Frame, Reserveir Hill, Inverell	22	15 ,,
V. Boland, "Scaton," Inverell		28 ,,	Sir F. H. Stewart, Dundas	6	30 ,,
E. D. Hordern, Cabramatta (A.I.S.)		29 ,,	Cowra Experiment Farm	41	27 Ju
t. Michael's Orphanage, Baulkham Hills		30 ,,	A. E. Liggins, "St. Leger Dairy," Kuring-gai		
V. S. Grant, Braidwood	14	14 July.	Chase Road, Turramurra North	52	7 July
. Hannaford	24	14 ,,	Kahlua Pastoral Co., "Kahlua," Coolac	314	10 ,,
t. Vincent's Boys' Home, Westmead	19	19 ,,	W. Budden, "Hunter View," Kayuga Road,		1
Juristone Agricultural High School, Glenfield		26 ,,	Muswellbrook	18	5 Aug
V. Turnbull, "Riverview," Muswellbrook	66	5 Aug.	The William Thompson Masonic School,		
eel River Land and Mineral Co., Tamworth		8	Baulkham Hills	50	29 ,,
(Beef Shorthorns)	. 16	26 Sept.	Navua Ltd., Grose Wold, via Richmond		
. I. Fairbairn, Woomargama	210	20 Sept.	(Jerseys)	113	4 Sep
. and C. Ryall, 5 Western Avenue, Wes		ı Oct.	Australian Missionary College, Cooranbong	113	8 ,,
Wollongong	57	1	Department of Education, Gosford Farm		
V. J. Stephenson, "Hill View," Fig Tree	2 3	10 ,,	Home A. L. Logue, "Thornbro," Muswellbrook	40	29 00
V. C. Wyatt, Sherwood Road, Merrylands	24			46	13 Oct
'hsman Bros., Inverell Fawkesbury Agricultural College, Richmond	25	17 ,,	Barnardo Farm School, Mowbray Park	108	4 No
(lerseys)	128	15	Lunacy Department, Kenmore Mental Hospital    Wollongbar Experiment Farm	112	5 No
egenhoe Isstates, Scone	1			10	4 Dec
inacy Department, Gladesville Menta	0.5	31	State Penitentiary, Long Bay	10	9 "
Rospital	. 22	14 Nov.	11	1	7044
Sathurst Experiment Farm (Ayrshires)	21	18 ,,		Ì	1944.
V. W. Martin "Narooma," Urana Road		*** **	Limond Bros., Morisset	60	13 Jan
Wagga	150	29 ,,	Department of Education, Yanco Agricultural		15 781
G. Wilson, Exeter (Jerseys)	68	20 "	High School	60	6 Feb
at the month to at the table to	1	1943.	Riverina Welfare Farm, Yanco		6 ,,
unacy Department, Callan Park Menta	1	1973.	St. Ignatius College, Riverview		"
Hospital	29	o Jan.	C. Wilton, Bligh Street, Muswellbrook	75	3 Mar
IcGarvie Smith Animal Health Farm, Liver	.]	y Jan.	N. L. Forster, Abington, Armidale (Aberdeen		3 .74241
Dool	65	r Feb.	Angus)	188	12
unacy Department, Parramatta Menta	1 03	I reb.	Forster and Sons, Abington Armidale (Jerseys)		13 ,
Hospital	31	6	Wagga Experiment Farm (Jerseys)	81	1 - 2
atorpited	·	0 ,,	ii trappe materiments a min (lersels)		20 .,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:-

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry.

#### WAR GOSSIP IS DANGEROUS.

Enemy agents are vitally interested in Australia's war effort. Don't assist them by discussing what you know about the manufacture and storage of munitions.

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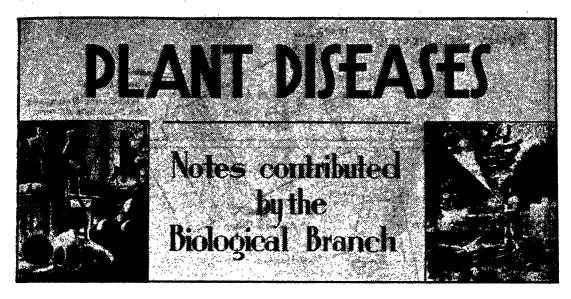
"ABERDEEN" COW RUGS ARE STOCKED AND SOLD BY ALL LEADING COUNTRY STORES AND SADDLERS.

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#### VEGETABLE SEED TREATMENTS.

MANY diseases of vegetable crops are caused by bacteria or fungi which are carried on, or in the seed. In most cases this source of possible trouble can be eliminated by appropriate treatment of the seed before sowing.

Treatments which have been found to be most effective are—

- (a) Dusting the seed before planting with a fungicidal dust;
- (b) Steeping the seed in a fungicidal solution; and
  - (c) Steeping the seed in hot water.

One or other of these methods is used according to the nature of the disease to be combated. The dust treatment has the added advantage that particles of the dust are carried into the soil on the seed-coat and exert a protective action against possible parasites in the soil as well as a disinfecting action on parasites borne on the seed. Thus dusted seed, if planted under unfavourable conditions, will not rot before germinating, and in some cases losses from damping-off will be checked.

Seed treatment alone will not always ensure absence of disease, but it is easily done, and as an insurance is always worth while.

Parasitic fungi and bacteria are harboured elsewhere than in the seed and in old crop refuse. They may occur in seedbed or field soil, in adjacent earlier planted crops, or on nearby weeds botanically related to the crop being grown. Thus crop rotation, weed control, seed bed and field sanitation, and sometimes spraying may also need consideration.

Dusts which may be used for vegetable seed treatment are copper carbonate, copper oxychloride, red cuprous oxide or the proprietary organic-mercury dusts, "Ceresan" and "Agrosan." Except where otherwise stated, the copper dusts should be used at the rate of one level teaspoonful per pound of seed and the organic-mercury dusts at the rate of ½ to ½ level teaspoonful per pound of seed.



A Flat Planted with Peas, Showing how Dusting the Seeds with Red Copper Oxide Protects them from "Pre-emergence" Damping-off, The same number of seeds was planted in each row.

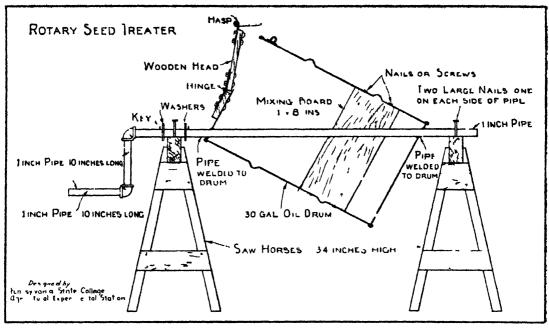


DIAGRAM OF A MACHINE SUITABLE FOR DUSTING LARGE QUANTITIFS OF SEED

Dusts are applied by placing the seed and the dust in a glass jar or other hidded container and shaking vigorously for 3 to 4 minutes until all seeds are thoroughly coated with the dust. Large quantities may be treated by rotating in a druin fitted with a diagonal axle (see diagram). Excess dust should be screened off. With small quantities of seed this can be done by running the seed over newspaper.

The recommended treatments are as follows —

BEET

Dust with copper dusts at rate of 4 level teaspoonsful per lb of seed or organic mercury dusts at rate of r level teaspoonful per lb

BROCCOLI, BRUSSELS SPROUTS CABBAGE CAULIFLOWERS KALE, KOHLRABI TURNIP

I reat in hot water before sowing lie the seed loosely 1 lb at a time in cheesecloth bags and suspend in a large volume of water (a kerosene tin full) previously heated to 122 deg lihr (50 deg () Use a small lamp to maintain the temperature or insulate the tin in a box of straw After treat ment spread out the seed to dry in the shade lime of treatment Cabbiges 5 minutes crucifers 18 minutes. Do not treat weak seed and if in doubt make a trial first with a small quantity of uced Do not dust seed of plants of the cabbage family with copper dusts

CARROT

Dust seed before sowing with copper or organic mercury dusts

CELERY

(see cabbage) 10 minutes at 135 deg I abi (57 deg C) Quickly spread out to dry in the shade 100 not treat old or weak seed

CUCUMBER PUMPKIN ROCKMELON SQUASH WATERMELON

Dust seed before sowing with copper or organic mercury dusts

ONION

Treat seed in hot water (see cabbage) for 25 minutes at 122 deg Fahr (50 deg ( )

PFA

Dust seed before sowing I se copper dusts at a rate of 2 or per bushel organic mercury dusts at rate of 1 or Peas which have been treated with nodule producing that erra should not be dusted

POTATO

Dip in acidulated mercuric chloride (4 or dissolved in I quart of commercial hydrochloric acid and added to 25 yallons of water) for 10 minutes. Use wooden container Plant immediately or dry thoroughly and store in a dry place. Discard solution after fiften dippings on their extend time of treatment 2 minutes for each additional dipping.

SPINACH

Dust seed before sowing with copper or organic-mercury dusts

JUNE 1, 1942.]

TOMATO

Dust seed before sowing with copper or organic-mercury dusts, or steep in mercuric chloride (‡ oz in 12½ pints of water) for 5 minutes, wash 15 minutes and dry

For the control of bacterial canker two alternative methods of seed treatment are available—

rut must be thoroughly liquified and the pulp permitted to ferment tor 4 days in a cool place. Structure a day to submerge any floating seeds or skin particles.

2 Acetic and soak—Dry seed.

2 Acetic acid soak — Dry seed should be soaked in a 0.6 per cent. solution of acetic acid for 24 hours

All chemicals mentioned above are poisonous, and together with treated seed should be kept away from children and animals.

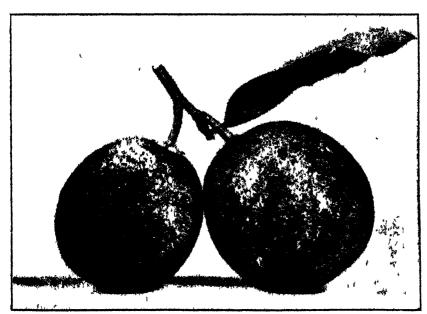
#### Melanose of Citrus.

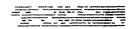
### Development Following Breaking of Summer Drought.

In coastal districts, the heavy rains in March which terminated the summer drought, were followed by a rather severe development of melanose on maincrop entrus, reports Mr. T. B. Keily, Assistant

In coastal citrus districts, the usual experience in the past has been that infection of maincrop fruit is limited to a period from petal-fall in mid-October to six or eight weeks later. Protective spraying with Bordeaux mixture at petal-fall on trees likely to develop melanose has consistently resulted in good control of this disease.

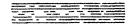
The recent late development is contrary to local experience, and possibly can only be explained on the basis of the very abnormal weather experienced. Extreme drought conditions prevailed throughout the summer, causing extensive wilting and leaf-fall in the majority of citrus orchards. developing fruit softened, but in the main, continued to hang on the trees. The tor-rential rain which fell between the middle and the end of March apparently provided excellent conditions for the infection of the wilted fruit. Severe tear-staining was produced, and on Washington Navel oranges often as much as three-fourths of the fruit surface was affected. At this stage, despite the fact that drought had restricted their development, young fruit averaged 2-21/2 inches in diameter, but were still green in





Young Washington Navel Oranges Showing Severe Type of Injury Due to Mclanose.

The oranges had reached this size before infection occurred About natural size.



Plant Pathologist stationed at Gosford. Washington Navel oranges were the most severely affected, Valencias moderately so, whilst with lemons only an occasional fruit was blemished.

colour. Much of the most seriously affected fruit subsequently fell from the trees.

Washington Navel orange trees on hillsides had wilted more severely in the drought and were more badly affected with the disease than similar trees of the same

age nearby on lower ground.

Immediately the condition was observed, a Bordeaux mixture spray was applied to some Washington Navel orange trees, and a suitable number of control (unsprayed) trees were left. Further heavy rain fell, but neither on the sprayed nor on the unsprayed trees did any further melanose development occur.

## Chemical Eradication of Crown Gall.

In an American publication recently to hand, P. A. Ark, of the University of California, gives some details of treatments which he has found effective for the eradication of crown gall on almonds and peaches The most promising of the mixtures tried by him was: Sodium dinitrocresol (Elgetol) 20 parts, and methyl alcohol 80 parts. Painted over the cleaned gall and ½ to 1 inch beyond it, this resulted in 100 per cent. killing of almond galls ranging from 3 to 10 inches in diameter.

Other formulae which gave very satisfactory results were:—

(a) Methyl alcohol .. . 50 parts
Glacial acetic acid .. 25 parts
Glycerine .. .. 25 parts
Metallic iodine .. . 10 parts

(b) Methyl alcohol ... 100 parts Glacial acetic acid ... 15 parts Metallic iodine ... 12 parts These iodine solutions were found to be most effective when applied in summer. Galls treated in hot weather were dead within two to three months.

Where the gall was so large that it almost girdled the trunk, it was found advisable to treat only part of it at a time, because if the whole surface were treated at once the accumulation of toxic chemicals in the tree might be sufficient to cause its death.



Crown Gall on Apple Tree.

#### Arsenical Residues on Vegetables.

THE facts relating to the use of arsenical dusts for the control of vegetable pests are that, though these dusts are poisonous, if used intelligently they are absolutely safe and do not constitute any menace to human health.

The presence of excess arsenic on the edible portions of plants which have been marketed renders the grower liable to prosecution and may cause the immediate condemnation of the whole consignment. Public health regulations permit the presence of only 14 parts per million of arsenious oxide on vegetables for human consumption, but recent analyses made by Health Department chemists have detected up to 30 parts per million of arsenious oxide on certain green vegetables. Arsenical residues of this magnitude are a scrious menace to human health and vege-

table growers should realise that the indiscrimmate use of lead arsenate dust cannot be tolerated.

The use of dusts containing arsenate of lead is the only satisfactory method of controlling many insect pests of vegetables and other crops. Lead arsenate dust is almost invariably used on cabbages and cauliflowers for the control of cabbage moth. Growers are warned, however, that such crops must never be dusted with lead arsenate after the plants have commenced to heart. Where beans are attacked by leaf-eating pests, they should not be dusted or sprayed with lead arsenate after the flowering period. Where such crops as lettuce and silver beet are attacked by vegetable weevil and cutworms, control should be effected by the use of poison baits; lead arensate should not be used on these crops.

## INSECT PESTS.

Notes contributed by the Entomological branch.







#### THE RED-LEGGED EARTH MITE.

(Penthaleus major.)

GROWERS are reminded that with the onset of cold weather the red-legged earth mite may be expected to cause damage over a period commencing from the middle of May until September. This mite occurs over a large section of the State, although the Upper Hunter and North-west Slopes appear more favourable for its development. A closely allied red-legged mite, Haloty-daeus destructor, which is confined to the southern sections of the State, has often been confused by growers with the more prevalent and widespread species.

#### Plants Attacked.

The red-legged earth mite was originally described as a pest of oats, but it is now known that cereals and grasses are not its favoured host plants. The preferred cultivated host plants are lettuce, peas, lucerne and subterranean clover, and amongst the pasture

ola) and nettle weed

weeds most frequently attacked are shepherd's purse (Capsella bursa-pastoris), variegated thistle (Silyhum marianum), prickly lettuce (Lactuca scare-

The Red-legged Earth Mite.

(Lamium amplexicaule). In addition to the above plants, the mites have been found attacking various vegetables, including turnips, rape, spinach, silver beet and beetroot, and garden flowers injured include chrysanthemum, calendula, stocks and snapdragons.

The typical conditions caused by the mites feeding on the plants, are blemishes on the leaves, which usually appear as silvery or greyish patches, generally along the main veins. In very heavy infestations the whole leaf surface may be damaged and present a bleached appearance. Seedlings, particularly of lucerne, may be killed outright, and this injury is often mistaken for frost damage. Pronounced damage of this kind is usually confined to late-sown crops which germinate and commence growth under conditions which are too cold

to allow them to outgrow the mite attack.

### Description and Life-history.

The adult mite, which measures about one-twenty-fifth of an inch in length, has a purplish-blue body. On its upper surface

there is an oval red patch, in the centre of which is the anus, and from this a drop of liquid is frequently exuded. The mouth

parts and legs are bright red.

The eggs are laid singly, generally on the soil under leaves and rubbish, although some may be laid on the plants on which the mites are feeding. The eggs are very small and measure about 1/250th of an inch across. They are deep orange-red in colour.

Detailed life-history studies have not been made, but it would appear that there are several generations during the year. The eggs hatch with the onset of cold weather, but only under suitable moisture conditions. and it is following the first autumn rains that the mites become sufficiently numerous to cause appreciable injury. Little development takes place during the summer. Although some mites may be observed feeding during the day, the majority feed during the early morning or towards sunset. During the day numbers of mites may be found clustering together in the centres of the infested plants or on the surface of the soil under the plants.

#### Control

In vegetable crops (and also in flower crops), the red-legged earth mite can be controlled by spraying with a nicotine sulphate plus white oil emulsion solution in the following proportions:—

White oil emulsion .. 5 fluid ounces. Nicotine sulphate .. 1 fluid ounce. Water .. 4 gallons.

The spray should be applied during the warmest part of the day, and a reasonably warm, fine day should be selected for the operation. In carrying out control measures it is essential to spray thoroughly the soil beneath the plants as well as the plants themselves.

Under field conditions a dust consisting of carbolic powder I lb., plus lime 4 lb., has given control of the mites. This dust is recommended for the treatment of infested ground before sowing a crop. The most effective time for its use would be two to three weeks after the beginning of the autumn rains.

#### Pests of Carrots.

PROBABLY the most important pests of carrots are the vegetable weevil (*Listroderes obliquus*), the carrot aphid (*Cavariclla* sp.) and leaf-hoppers or jassids (*Jassidae*).

#### The Vegetable Weevil.

The life history of the vegetable weevil was described in these Notes last month, when measures suitable for the control of this pest, both the larvae and adult weevils, in crops such as turnips and beetroot were set out.

For carrots, of which the tops are not used as food, a stronger lead arsenate mixture may be used, and for the control of larvae during the winter and adults in the spring the following naxtures are recommended:—

The Spray.

Lead arsenate powder .. 4 oz. Water . . . . 5 gallons.

The Dust.

Lead arsenate powder .. 1 lb. Kaolin or hydrated lime .. 4 lb.

#### PREVENTIVE MEASURES.

As vegetable weevils also feed on a wide variety of weeds—in particular on Cape weed (Cryptostemma calendulaceum) and marsh mallows (Malva sp.)—in addition to carrots and other winter vegetables, it will be seen that clean cultivation is an important factor in their control. All weeds, etc., should be destroyed early in the winter and the ground then kept free of weeds until sowing time. The destruction of weeds late in the season may cause the weevils to migrate into cultivated areas.

As an additional precaution ground that has been cleared should be baited after an interval of several days either with poisoned foliage or poisoned bran mash. This procedure is particularly important where any ground is known to have been infested or there is suspicion that it is infested. For baiting, chopped leaves of Cape weed, marsh mallows or waste lettuce leaves, etc., which have been either sprayed or dusted with lead arsenate, should be scattered over the ground late in the afternoon.

Molasses is now unobtainable, and salt should be substituted in the preparation of poisoned bran mash. The formula recommended is as follows:—

The sodium arsenite should be dissolved in the water, the salt then added and the mash prepared. If Paris green is used it is mixed dry with the bran and the mash prepared with the water in which the salt has been dissolved. The bait should be broadcast and partly worked into the soil late in the afternoon.

#### Carrot Aphids.

The foliage of carrots, at times, becomes severely infested with the carrot aphid. The winged forms of this small aphid are green in colour, but the wingless forms are usually yellowish. They feed mainly on the under-surfaces of the leaves, and when abundant may cause the leaves to curl and dry up, thus weakening the whole plant. In addition, the foliage becomes covered with sticky "honey dew" which they excrete

#### CONTROL.

Control may be obtained by spraying with a nicotine solution or dusting with nicotine dust.

The Spray.

Nicotine sulphate .. I fluid ounce Soap .. .. 2 ounces.

Water .. . 4 gallons.

The Dust.

Nicotine dust .. ..  $2\frac{1}{2}$  per cent.

Nicotine dust may be obtained ready for use, or may be prepared by mixing thoroughly I lb. of nicotine sulphate with 16 lb. of hydrated lime. Some form of revolving container is necessary when quantities of the dust have to be prepared. Several rounded stones placed in the container will assist in the mixing. The nicotine solution should be added slowly while mixing.

If both vegetable weevils and aphids or vegetable weevils and leaf-hoppers are present on the plants, a combined spray or dust may be used.

The Spray.

Lead arsenate powder .. 4 ounces. Nicotine sulphate .. . 2 fld. oz. Bordeaux mixture (1:1:20) 4 gals.

#### The Dust.

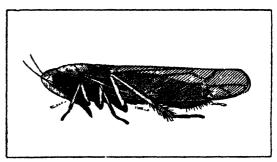
Arsenate of lead powder .. I lb. Hydrated lime .. .. 4 lb. Nicotine sulphate ..  $5\frac{1}{2}$  fld. oz.

Proprietary dusts containing arsenate of lead and nicotine sulphate are obtainable, but in order to conserve supplies of nicotine sulphate these combined dusts should not be used where only an arsenate of lead dust is required. It is uneconomical and wasteful to use a combined spray or dust when only one of the above pests is present.

#### Leaf-Hoppers or Jassids.

Leaf-hoppers are small, yellowish-green insects which feed by sucking the sap. Their hind legs are formed for jumping, and in their adult stage they possess two pairs of wings. The immature insects are paler in colour than the adults, but resemble them in general form, except that the wings are not developed.

The control recommended is a combined nicotine sulphate and weak Bordeaux (I:I:20) mixture. If aphids are also present this spray will control them at the same time.



The Adult of a Leaf-hopper or Jassid.

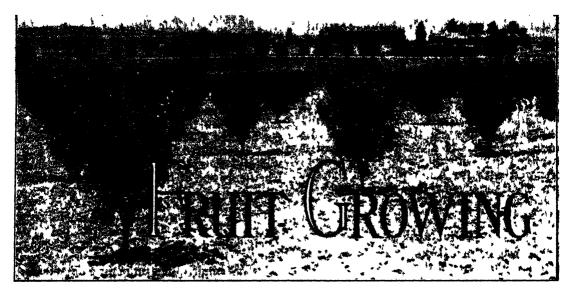
Preparation of Bordeaux Mixture.

The Bordeaux mixture may be prepared by mixing the hydrated lime with oneeighth of the total volume of water. The bluestone is dissolved in the remaining seven-eighths of the water. The lime is then added to the bluestone solution.

The proportions are:-

Hydrated lime ... I lh. Copper sulphate (bluestone) I lb. Water ... 20 gals.

Bluestone should always be dissolved in a wooden, earthenware or copper container. Iron and galvanised iron vessels must not be used.



#### SPECIALISE!

#### Select Your Fruit Varieties According to Your District Conditions.

I ( WIIII I \KIR I ruit In tructor

THE need for further specialisation throughout the fruit growing areas has been apparent for many years. "Too many types of fruit" and "too many varieties" are common complaints in almost all districts of the State, and with new varieties of the main kinds of fruit—many of them of real merit—appearing from time to time the position is likely to get worse, unless some thought is given to future plantings and reworkings. The vital importance of the selection of fruit types and varieties for soils, sites and climates which are congenial to them cannot be stressed too much.

Fruit trees, even under conditions closely approximating their natural environment, are subject to enough pest and disease troubles to keep the average grower fully occupied but when unnatural growing conditions are added to the other troubles, the position becomes, if not perhaps hopeless, at least uneconomic

Much of our present trouble from the use of unsuitable varieties etc. was perhaps inevitable as the result of the circumstances that obtained during the period from about 1914 until the early twenties. At that time quite a number of new fruit areas came into being and the early growers on these are is having little of no previous plantings to guide them relied largely on a "Int or miss" type of multiple variety planting, in the hope that some at least, of the varieties which had already proved profitable elsewhere would do likewise under their particular conditions

At the present time however the position is considerably more stable. The good fruit areas are more or less defined, and at the moment it does not appear that there will be any great extension of plantings—for some time at least—outside these areas. Thus the intending grower now has the benefit of past mistakes to guide him, and

there is no excuse for the planting of a multiplicity of varieties unsuitable either for the market or the particular are i in which they are grown. This statement is not intended to convex the impression that there are no further districts in the State cipable of growing fruit apart from the existing are is. Quite the contribution in the existing areas. Quite the contribution is the case as there are considerable areas, so far untouched, which could be utilised for one kind of fruit or another but it is a fact that any extension of fruit growing outside the present recognised districts needs most careful consideration from a variety of angles but principally from that of wallable markets.

#### Apples and Pears.

Let us first of all consider the position of the apple and pear grower. The past twenty years or so have proved that there are relatively few of the present apple and pear districts in the State where practically all varieties of these fruits may be grown satisfactorily, but on the other hand there are quite a number where a very limited range of varieties might be expected to succeed reasonably well. However, even as regards the first mentioned districts, the limitations imposed

by popular demand and available markets preclude the growing of any great multiplicity of varieties; hence, although such areas will produce most varieties to perfection, there is, nevertheless, no sense in growing most of them. Furthermore, the more general use of cool storage facilities during the past decade or two obviates the necessity on the pome fruit grower's part to plant a large number of varieties in order to spread his seasonal work over a fair period.

Thus the necessity for strict limitation of varieties is indicated, and to that end the intending grower should first ask himself the following two questions: (1) What varieties are in popular demand, and (2) which of these varieties are most suitable to my particular area? Upon the correct answering of these two questions depends the success of the venture.

Throughout the State we have a wide range of soils and climates in districts ranging from the carly coastal areas to the late highland districts such as Batlow, Orange, etc. The coastal areas, being very early, make a particularly valuable contribution to the apple market, in so far as they can supply the early season demand for apples after the cool stored fruit is finished, and before the new season's crop commences to come in from the main pome fruit districts. At this particular period these areas have a practical monopoly of the apple trade, hence the logical thing to do would be to cater exclusively for this trade by growing only the better class early apples, and leave the later sorts to the districts more suited to them. Likewise, the later districts would be better specialising in the handful of better class midseason and late varieties, leaving the earlier varieties to the early districts.

This should overcome, to a large extent, the ever-recurring somewhat chaotic conditions pertaining to marketing which now obtain, when early varieties are often marketed in competition with better midseason and late sorts, and nice versa—with a percentage of practically unwanted varieties coming on to the market all the time.

Unwanted varieties are fortunately gradually decreasing year by year as more and more are reworked or destroyed, but it is perhaps advisable to point out that the position on the market of these "dud" varieties is practically certain to deteriorate rapidly from now on, as more and more of the comparatively few popular varieties come into bearing from plantings and reworkings over the past few years—and therefore the continued growing of these second-rate varieties can lead to little save disappointment for all concerned.

#### The Influence of Climate.

In a general way, it may be said that with one of two unimportant exceptions, the coloured varieties of apples are not suitable for production on a commercial scale throughout the hotter and drier districts—and this is particularly exemplified in the case of the Delicious. Coloured varieties grown in districts such as the Murrumbidgee Irrigation Area. Forbes, etc., for instance, cannot be compared in any way with the same varieties grown, say, at Batlow, Orange, or any of the

other high altitude and better natural rainfall areas, and as the production of such varietiesparticularly Delicious-is increasing year by year in these latter areas, it would be simply foolhardy to persevere with the growing of them in any unsuitable locality. On the other hand, the Granny Smith variety is most cosmopolitan in requirements for growing conditions, and succeeds reasonably well in a wide variety of climates, soils, rainfalls and altitudes, etc. In this respect, it is perhaps unique, but even so, though it may grow and produce reasonably well in a more or less unnatural environment, there are other factors such as the difficulty of controlling moth and the sunscald problem in the hotter districts to consider, and therefore, from an economic point of view it is very questionable whether land given over to the growing of Granny Smith apples in many areas would not be better utilised and return a better profit to the grower if producing some other type of fruit more suited to the local conditions.

#### Few Profitable Pear Varieties.

The position so far as future pear planting is concerned is somewhat similar to that of apples, except that the really good pear districts are much more limited in number, and the profitable pear varieties in popular demand are also much more restricted than are apples. Many of the early districts, and some of the inland ones, which produce passable apples of certain varieties, are not recommended for pear growing—not so much because the pears will not grow, but more from an economic angle. Under present day conditions, it is not enough merely to be able to grow a fruit, but it must be produced in quantity and quality and sufficiently economically, to meet the competition from the product of other, and perhaps better favoured areas.

#### Harvesting Period is Important with Stone Fruits.

Turning to the stone fruits—we find a vastly different state of affairs as compared to apples and pears. Cool storage, for instance, does not enter the picture to any great extent, as very few stone fruit varieties are suitable for anything more than very limited periods of cool storage, whilst the necessity for pest control, and other factors, preclude to a large extent the growing on the coastal belt of the later ripening sorts of peaches, plums, etc., and the distance from markets militates against the growing of the softer early varieties—except to a limited extent, and mainly for local demands—throughout the later, inland areas.

Cherries are somewhat exacting in their demands as to climate, etc., and we find practically all the cherry growing in the State confined to the Tableland areas.

Thus, taken in a general way, the position as regards the growing of stone fruits in the various districts has to a large extent sorted itself out rather well. However, in spite of this, intending growers should keep in mind the fact that even in recognised sound stone fruit districts, there may be differences of soil and location which will suit

some varieties better than others, and further, there is the matter of ripening sequence to consider.

Stone fruits generally have a strictly limited harvesting period, hence when planting, due provision must be made by means of selection of varieties, not only to ensure suitability to the locality, but also, according to their picking periods, to spread the work of harvesting and marketing over a reasonable period.

In the coastal stone fruit areas, this is a comparatively casy matter, as there is a wide selection of very early, and early to midseason types and varieties to choose from, but it is well to remember that even in the better favoured localities, the end of January is usually as late as it is advisable to continue picking, owing to the expense of controlling various pests and to com-

proven varieties and let the other fellow experiment with the rest. After all, his results will usually be available to you almost as soon as they are to him.

In some of the closer tableland districts, it is probable that some of the earlier varieties would be a reasonably profitable venture, but the farther west the greater the necessity to restrict plantings to the better carrying sorts, except when—as before stated—a reasonable local market exists in nearby towns, in which case small plantings of some of the earlier varieties may prove profitable.

some of the earlier varieties may prove profitable.

The intending grower is therefore invited to reflect on the truth of the saying "The time to ensure a payable orchard is at planting time."

With increasing competition from the better districts which are growing the varieties in popular demand, it is inevitable that many places in un-



Well-grown Granny Smith Trees at Orange.

A popular commercial variety grown in a favourable locality.

petition from tableland and inland areas. This competition will be increasingly felt as new plantings continue to develop in these parts. Peaches such as J. H. Hale Dripstone Elberta, etc., are eminently suited for growing inland, owing to their excellent carrying characteristics, and conversely the inland conditions apparently suit the peaches. Thus, there is bound to be a considerable increase in production of these and one or two other varieties throughout the non-coastal areas in the near future.

However, just because there is a wide field to select from, it does not necessarily follow that a grower should plant a wide selection—it is a much wiser practice to stick to a few well tried and

favourable localities must ultimately go out of production—in many cases with little profit and much hard labour in the meantime for the unfortunate growers.

Favourable climate, soil and situation are the great essentials in selecting the new orchard site, and if your district is outstandingly suited to grow one particular type of fruit, then specialise in it and let the other chap—in some other area more suited to them—grow the rest. After all, to-day is the era of specialists in all walks of life, and there is no reason why the fruit grower should not be one also—a specialist in one type of fruit or even maybe in one variety of one type, according to his particular locality.

#### RE-SOILING THE ORCHARD.

A. C. Arnot, H.D.A., Fruit Inspector.

The heavy rains in March have resulted in more or less severe crosion in most coastal citrus orchards, and the grower, despite shortage of labour, should do his best to replace this valuable surface soil. It is the writer's opinion that on hillside orchards no other operation returns such good dividends in solid cash, as does resoiling. It should be the grower's aim actually to increase the depth of soil on his orchard, and not merely to replace what is lost by erosion. Future erosion will be considerably less if there is a greater depth of soil all over the orchard to absorb the rain—in the same way that a large sponge will absorb more water than a small one.

Resoiling is usually more necessary, and shows greater results on sloping than on level ground, and on shallow soils rather than on deeper soils. Especially is this the case if satisfactory surface

drainage is lacking.

For a distance of up to about 40 yards, a scoop can be used, but for longer hauls it is more economical to use a dray or, better still, an "orchard tipping cart" on an old motor-car axle and rubber tyres, as, being lower, it is much easier to fill than a dray, and moreover pulls easier.

The soil should be tipped in the places from which it has washed away, and then if the grower can find time to go on with the work, one or

two loads should be tipped on the bottom side of each tree. When spreading the soil, some should be thrown under the tree on the bottom side, but not enough to cover up the union, as this might induce collar-rot. The bulk of the soil should be left just outside the foliage on the bottom side of the trees, so that the cultivation implements will not cut the roots of the trees.

The reason for tipping the soil on the bottom side of the trees is that the soil is always shallower there, as it tends to slip down hill all the time and bank up on the top side of the trees of the row below. If the grower can afford the expense, it is a good idea to spread fertiliser on the ground before the soil is tipped on it.

To sum up, the advantages of resoiling are:—

- (1) It replaces soil lost by erosion.
- (2) It reduces future erosion.
- (3) It covers up the roots so that they are not cut and torn about by cultivation instruments, and keeps them cooler and moister in a hot dry time.
- (4) It covers up the surface soil in which a considerable proportion of the phosphoric acid and potash in artificial fertilisers has been fixed, so that the roots of the trees can function with less likelihood of being disturbed.

## Selected Citrus Buds.

#### The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1941 budding season, trees from which should be available for planting during the 1942 season:—

	Washing- ton Navel.	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lisbon Lemon.	Emperor Mandarm.	Total.
Adamson, T	4,000	4,000		2,000	•••		10,000
Cambourn, H	3,500	5,000		კ,იია	•••	•••	11,500
Catt, F. D	3,000	3,000		3,000	1,000		10,000
Eyles, A. T	5,000	5,000	1,000	2,000	•••		13,000
Ferguson, E H	1,000	1,500		500			3,000
Ferguson, F., & Son	2,500	2,500	l l				5,000
McKee, Geo	7 700	1,000	l l	1,000	1,000		4,500
Rosen, L. P., & Son	10,000	15,000	2,000	5,000	1,000	800	33,800
Smith, W		- 3,-		2,000	•••		2,000
Spurway, F. E, & Son	3,500	5,000	750	500	250	1	10,000
Swane Bros	5,000	2,000	1,000	1,000	1,000	800	10,800
	39,000	44,000	4,750	20,000	4,250	1,600	113,600



## The Honey Market

## And Problems of Securing Equipment.

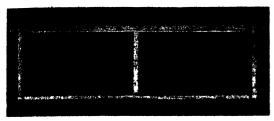
THE production of honey during autumn was on the light side and in consequence some difficulty may be experienced in maintaining our essential trade. It may be, however, that a number of bee farmers are holding fair quantities on the farm, particularly in districts where production was heavy during the past spring and summer, and if these supplies are forwarded to market at an early date the position will be relieved until such time as the first of the new season's supply becomes available.

In New South Wales it has been possible so far to maintain a progressive local and overseas trade in honey, and, in addition, supply upwards of a million pounds to Queensland. The production in Queensland was evidently well below average during the 1941-1942 season. With the uncertain position in regard to shipping space for overseas trade, it is obvious that everything possible should be done to foster local de-To carry on during the next few months all supplies held on farms will be required. Even if beekeepers are not prepared to release stocks on hand, it would be helpful, at least, if they would give to the people usually responsible for marketing particulars concerning the quantity and type of honey held on the farm.

#### Order Equipment Early.

A list of all essential hive material, honey containers, and honey-house equipment should be prepared now. The position concerning supplies is difficult enough at any time, but if purchases be held over until the commencement of the honey producing season this year, and a rush of orders comes in to the manufacturers, there are bound to be many disappointments. Manufacturers have to contend with a serious shortage of labour, as well as the difficulty of securing supplies of materials, and they are not in a position to carry any heavy surplus To relieve the position it is suggested that orders be placed earlier than usual so that they may be supplied as stocks become available. Last year a bee farmer stated that a complete list of his requirements would cost £200, so he decided then to revise the list, striking out every article that was not strictly essential. Finally the order was reduced to £50. Perhaps his example could be followed with advantage by many others during the 1942-43 season.

A close survey of the honey-flow prospects will serve as a guide in determining the quantity of hive material and number



Super Frame Used by Messrs, A. E. Norton and Sons.

of honey containers required, but here again many will come up against petrol rationing, which is likely to limit extensive migratory work. It is evident that localities nearer home than usual will need to be considered, even though the honey-flow prospects may not be so promising.

#### Evacuation of Apiaries.

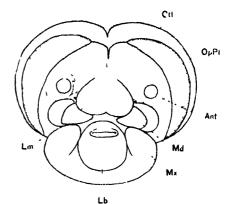
Provided there is prospect of some reasonable return being secured elsewhere, the movement of bees from north coast river country should be encouraged. Evacuation of apiaries does not appear to be probable under present conditions, but it is considered desirable that an attempt be made to build up some organised scheme whereby assistance may be given should evacuation of commercial bee farms become necessary. The matter has already been taken up by the Primary Industries Evacuation Committee, and officers of the Apiary Branch. together with a number of prominent bee farmers, have been invited to co-operate m the preparation of a useful plan.

#### Hints on Preparing Frames.

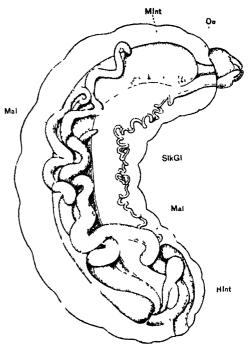
During a recent visit to the apiaries of Messrs. A E. Norton and Sons at Tamworth, the writer was interested in observing the methods applied in preparing frames for use in the hives. The eight-frame full depth brood chamber with modified bolton supers for honey storage is preferred by the company. Three wires are placed in the super frames, the top one being within a

1/4 inch of the top bar. This obviates the need for fastening comb foundation to the top bar, for which purpose an electric embedder is usually employed.

A further addition to the frame is made by fitting a 3%-inch square wooden upright halfway along the frame and connecting the top and bottom bars (see illustration). The outside of this support is flush with the



Head of Bee Larva.



Sketch of Digestive System of Bee Larva
[Jnl Agri. Leventh

edge of the frame at the side of the wires, and is nailed in firmly with 11/4-in, panel pins. Mr. Norton, senior, mentioned that the object of the prop is to strengthen the frame at its centre, the weakest part. It prevents the breaking of combs, and the pulling of the bottom bars out of shape during hive manipulations, particularly when attached to burr-comb.

Another innovation is the rounding of the top and bottom corners of the side-bars of the modified bolton frames. who has used this frame for some time will have experienced difficulty in returning the frames to the hives, especially the last one to be inserted, but in rounding off the shoulders of the side bars, as practised by Messrs. Norton and Sons, this difficulty is overcome. The rounded shoulders guide the frame into position when inserting it, requiring only the application of light pressure to force it into position.

#### The Bee Larva.

All bee farmers are interested in the appearance and daily development of the pearly-white bee larva in the brood combs, but observations by means of a miscroscope create an added interest. For instance, very few have observed that a worker bee larva has a face as shown in the accompanying illustration. The other illustration shows the digestive system of the bee larva, where brood disease develops if spores of the disease are fed to the larva during the feeding stage.

The larvae of a vigorous strain of bees show a good deal of resistance to disease and our selected Italian strains are particularly noted in this regard. It is considered also that well-planned seasonal management in the apiary will assist in building up resistance. It ensures, for instance, that each colony has an adequate supply of stores so that the bee larva will be well provided with food during development.

Bee larvae are like babies inasmuch as they need to be properly fed and kept comfortably warm. With proper attention they grow apace and remain healthy. We may look for trouble, however, if they are allowed to be fed on unnatural or contaminated food. The main brood rearing season for bees will commence during spring, but the success of a colony's effort to build up in strength will depend to a great extent on the care exercised by the bee farmer to provide comfortable winter quarters and to ensure that an adequate supply of good wholesome food is available for the winter and early spring needs of the bees for brood rearing,

#### Import and Export of Animals and Animal Products.

#### Regulations Recently Altered.

CHANGES have been made recently in the regulations governing the introduction and export of livestock and animal products. In addition to the more important alterations mentioned below, other motor points of difference have been introduced, and consequently it would be a sound precaution on the part of those proposing to introduce animals or animal products to contact the office of the (hief Quarantine Officer (Animals), Department of Agriculture, Sydney, before making final arrangements.

For the first time, the Commonwealth Government has exercised its powers in general concerning the export of livestock, and it is now provided that a person shall not export any horses, cattle, sheep, goars, swine, dogs or poul-try unless the animals have been examined at the port of shipment by a Quarantine Officer who is a Veterinary Surgeon, during the period of fortyeight hours immediately preceding shipment.

With regard to the importation of animals and material which might possibly be the means of introducing disease into this country, the more important changes which have taken place are the

following.

Domesticated animals can no longer be imported for the purpose of exhibition in circuses and theatres without undergoing the usual quarantine period at a Quarantine Station in the same way as is provided for domesticated animals introduced for other purposes.

Aviary birds are now permitted to be introduced only from the same countries as from which poultry may be imported. These countries are Great Britain, Northern Ireland, Eire or New Zealand. This prohibition does not include hirds of the parrot family other than budgerigars

In order to prevent any risk of introducing foot and mouth disease by means of straw packing, the regulations previously enforced are being repeated, but the same regulations have now been made applicable to other unprocessed vegetable

Cats introduced from abroad are now required to enter a Quarantine Station under the same conditions as dogs. Provision has been made for the disinfection of wharves, buildings vehicles with which imported goods may come into contact.



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The Public Trustee, 19 O'Connell Street,
(Box 7A, G.P.O.), Sydney.

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Our 26 years of breeding experience have enabled us to produce these chickens, and a trial order will convince you of their value.

	- PKI	CEB PRU	IN IST J	UNE.		
		UNSE			PULLETS	
AUSTRALORP:	100	50	25	100	50	2.5
Day-old chicks.	£3 5 (	21 15 1	81 03 0	6 £6 5 0	23 5 0	0 31 12
a weeks old	5 5 (	2 15	0 1 8	8 0 5 0	£3 5 0 4 5 0	2 5 0
CROSSBRED:						_
Day-old chicks	3 5 (	0 1 15 1	0 0 17	6 6 5 0	8 5 0	1 15 0
3 weeks old .	5 5 (	) 2 15 1	0 1 8	6 8 5 0	8 5 0	2 5 0
WHITE LEGHORN:						
Day-old chicks	30(	0 1121	6 D 17	8 5 15 0	3 0 0	1 12 6
3 weeks old	5 0 (	2 12 1	6 1 7	6 7 15 0	3 0 0	2 2 6
COCKERELS:	Prices	on applicat	tion.			
FREE AND SAFE	DELIVERY	GUARANTEE	D TO ANY	RAILWAY ST	ATION IN N.S.V	N.

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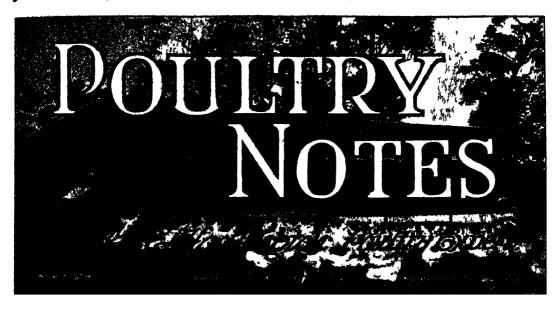
Standardised Analysis: — 47/50% Proteins. 30/33% Minerals. 8% Moisture.

Guaranteed Analysis:—Minimum Crude Protein 60%. Minimum Crude Fat 9%. Moisture 8%.

Guaranteed Analysis:—Moisture 5.4%. Protein 8.5%. Fat 1.5%. Minerals 86%.

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- Riverstone Meat Co. Pty. Ltd., 5 O'Connell Street, Sydney.
- Bedbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- W. Angliss & Co. (Aust.) Pty. Ltd.,
   42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Creek, Rockhampton.



#### LABOUR FOR POULTRY FARMING.

THE recent announcement by the Director-General of Manpower concerning the allocation of labour for poultry farming, was opportune as it will enable poultry farmers to make their dispositions regarding the hatching season with greater confidence as far as the labour position is concerned.

The decisions arrived at in respect of manpower will not however help those who have already had their farms heavily depleted of labour and have been forced to reduce their flocks or those who have had to give up their farms on account of being called up for military service. In view of this and the fact that allowance is only made for minimum labour requirements it might be difficult to maintain production on a level sufficient to meet future requirements even allowing for full use of storage facilities for next autumn

Thus there appears every prospect of a substantial improvement in returns which after last year's accord low figures, will be necessary to prevent egg production falling below local demand

#### Particulars of Labour Allocations.

The full details in connection with the allocations of labour for poultry farming decided upon by the Director-General of Manpower, are given hereunder.—

(1) Commercial Poultry I armers

NUMBER OF BIRDS 600 to 1 000 layers 1,500 to 2,000 layers

F very additional 1 500 layers over 2 500

ALLOCATION OF I ABOUR

t fit man or woman t ht man or woman and t farm hand

An additional farm hand

(2) Hatcheries Not Associated with a I arm INCUBATOR ( APACITY 30 000 eggs Over 40 000 eggs

ALLOCATION OF LABOUR

t fit man or woman 1 fit man or woman and one employee

INCUBATOR CAPACITY 10,000 to 25 000 eggs

(3) Hatcheries Operated in Conjunction with a I aim ALLOCATION OF I ABOUR

> i fit man or woman in addition to the allocation of labour for a farm of 2 000 layers provided that not less than 2 000 layers are kept

30 (iii) eggs and over

2 fit men or women in addition to the allocation of labour for a farm of 4 000 lavers provided that not less than 4 000 layers are kept

#### NOIIS.

(a) The allowances of labour are inclusive of the owner of the fowls in every in stance whether man or

woman, unless the owner be physically unfit, but exclusive of part time family assistance (wife and/or

children)

(b) The gaps between 1,000 and 1,500 layers, and between 2,000 and 2,500 are deliberately left for the reason that part time family assistance is a factor in poultry farming and that such margins are capable of being coped with through assistance of the kind. Moreover, they dispose of small margins which might create difficulties for National Service Officers. Furthermore, the margins emphasise the fact that

only a minimum of manpower can be allocated in existing circumstances.

(c) The allowances of labour for hatcheries are inclusive of the owner whether man or woman, unless the owner be physically unfit, but exclusive of part time family assistance (wife and/or children).

Definition of a Commercial Poultry Farm.—A farm on which a flock of not less than 600 layers is kept.

Definition of a Layer—A female fowl, duck or turkey, not less than 6 months old.

#### Get the Brooders Ready.

If the brooders have not already been overhauled, this work should be attended to so that everything will be in working order for the chickens when they arrive. Various items need to be checked.

For instance, in the case of brooders which are heated by a lamp, it is necessary to see that the wicks are renewed where required, and that the burners are thoroughly cleaned. Where coke stoves are used these should be looked over to ascertain if there are any missing parts, or whether new grates are wanted; also that the chimney is in good order.

If a hot water circulating system is installed, similar attention is necessary, and in addition, if it has been in use for a few years, the pipes will probably require to be flushed out and the supply tank renewed. In cases where the boiler is worked on the floor level, the pipes should be checked to see that there has been no alteration in the levels due to ground contractions. This is likely to have occurred after the heavy rains during

March, which followed the long spell of dry weather.

In electric brooders, new elements might be required, and, under present conditions, such parts might not be readily obtainable. Any type of brooder with a curtain might need renewals of the flannel or felt material, and careful attention should be given to this, because the curtain plays an important part in maintaining the correct temperature. In many instances curtains are not kept in good order, and the result is that the young chickens get a chill and mortality occurs.

The sanitation of the brooders should, of course, have been attended to at the end of the previous season, but a spraying with a strong disinfectant before they are used again is desirable. Should the outside runs be overgrown with tall weeds or grass, it is advisable to clean up all useless growth so that the small chickens can run about without becoming wet on dewy mornings.

Attention to these matters will help materially towards successful rearing of the chickens.

#### Packing and Transport of Eggs.

TO assist those new to the industry and those country producers who now consign their eggs to the Egg Marketing Board, to market their eggs in the best possible condition and thus avoid many quality defects, further hints are given on the handling of eggs. In previous issues various aspects of collecting, cleaning, and prevention of soiling were dealt with.

There are many small factors in the handling of eggs which have an important bearing upon quality, but one simple instance will perhaps serve to illustrate the necessity for paying attention to details.

#### Pack Large End Upwards.

In packing eggs many producers do not take the trouble to see that all are put in

the fillers with the large end upwards. While failure to do this might have no serious effect when eggs are fresh and transported over short distances on good roads, the reverse is the case, particularly during the hot weather, when they have to be sent long distances by rail or road, especially if they are not quite fresh and the trip is rough. Under these conditions, if the eggs are packed with the large end downwards, the air cells of many become ruptured, causing air bubbles or what are known as tremulous air cells, and this results in their being classified below first grade. Experiments carried out by the Department some years ago showed that among eggs sent from Grafton to Sydney, after having been kept for a week and packed large end downwards, the number affected with tremulous and large air cells reached as high as 68 per cent. compared with only 11 per cent. in those with the large end upwards. Similar results have been experienced overseas.

Not only does packing the large end downwards cause these troubles, but there is a greater risk of breakage occurring on account of the limited resistance of the large end compared with the small. Thus any pressure on large eggs is likely to result in a greater proportion of cracked or broken eggs.

#### Use of Buffers.

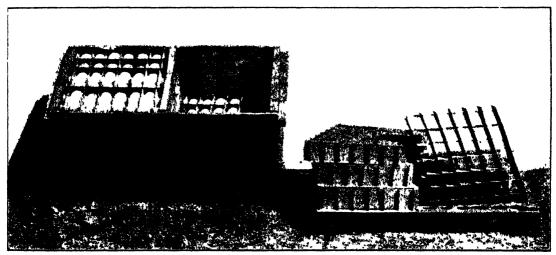
A number of other simple precautions should be taken in packing, especially when the eggs have to travel long distances or over rough roads. First comes the placing of a buffer on the bottom of the case before

crumpled piece of newspaper or a little woodwool should be packed between each filler and the walls of the cases. As the case is being filled a flat is placed on each filler and, of course, on the top fillers, but here again another buffer is required, and as woodwool pads are not supplied for this purpose, a crumpled pad of newspaper will suffice to prevent the top flats from slipping out and will hold the fillers more rigid. However, undue pressure should not be caused on top of the eggs.

#### Filling the Cases.

In placing the eggs in the fillers there are a few important points to be observed. The first essential is that the eggs, also the fillers and flats, be thoroughly dry, as any moisture will result in staining of the eggs.

Care should be taken that no long eggs project above the level of the fillers, and that



PACK EGGS WITH THE LARGE END UPWARDS.

putting in the first filler. In all egg cases sent out by the Egg Marketing Board there are woodwool pads for this purpose, but in the event of such pads having gone astray, the next best course is to use a pad of straw or dry grass, or crumple up a double sheet of newspaper for each half of the case and place it evenly over the bottom, then put in the cardboard flat followed by the fillers.

In most instances there is a space between the fillers and the sides or ends of the cases, and this allows too much movement of the fillers when transported over rough roads, often causing breakages. To avoid this, a no eggs are unduly tight in the cells. Any large eggs can be placed in the corner cells or along the sides of the fillers where they can be turned at a slight angle to prevent them protruding above. Abnormally large eggs should not be packed.

After completing the packing, the number of eggs in the case should be clearly marked on the label, together with the name and address of the sender. If the cases are not being despatched at once, it is essential that they be not exposed to the sun or wind. If a carrier is collecting the cases he should be requested to keep them covered during

transit, and not to expose them to heat and wind.

#### Transport Arrangements.

In the case of country producers who convey the eggs to rail or depot, the same points should be observed, and when despatched by rail these matters might be brought under the notice of the railway officers. If the eggs are to be transported over rough roads, it is advisable to have a straw padding on the floor of the vehicle, and if necessary, between the side and the cases. Such pads could be made by loosely filling sacks with straw or grass.

By giving attention to these details much can be done towards preventing breakages

and quality troubles.

#### Douglas Mixture (An Iron Tonic).

For the information of inquirers particulars are given hereunder of the method of preparing Douglas mixture:--

Dissolve 4 ounces of epsom salts and 4 ounces of sulphate of iron in 1 gallon of boiling water. Allow this to cool, then add 12 ounce of dilute sulphuric acid. The mix-

ture should then be bottled in a glass or earthenware container ready for use, and should be labelled "Poison." The dosage is a tablespoonfuls to each gallon of drinking water given twice weekly for three to four weeks at a time. The sulphuric acid of a standard dilution is obtainable from chemists.

#### Chick Sexing Examinations, 1942.

It has been decided to hold only two chick sexing examinations this season—on 9th and 23rd September—unless sufficient applications are received for an examination prior to these dates, when consideration will be given to the holding of additional examinations.

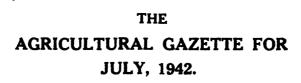
Candidates desiring to attend an examination should make application to the Under Secretary, Department of Agriculture, Box 36A. G.P.O., Sydney, at least one month prior to the due date and forward a remittance of tos. 6d. for the examination fee. The cost of the chickens required has also to be borne by the candidate; the rate per hundred cannot be stated until quotations have been obtained, but applicants will be informed of the cost before arrangements for the examinations are finalised.

#### Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Owner and Address.	Number in herd.		Number in herd.
Bathurst Experiment Farm (Ayrshires)  Bauerle, P. A., Holbrook  Bush, W., Ben Lomond  Carrick, G., 'Cloulea,' Central I'tha  Cowra Experiment Farm (Ayrshires)  Curtis, A., Mervla, Morven  Department of Elucation Farm Home for Boys  Gosford  Department of Education—Farm Home for Boys  Mittagong  Dixson, R. C., 'Elwatan,'' Castle Hill  Edwards G. M., "Rothwick," Uralla (Jerseys)  Fairbridge Farm School, Molong  Farrer Memorial Agricultural High School, Nemingha.  Forster, N. L., Abington, Armidale (Jerseys)  Hawkesbury Agricultural College, Richmond (Jerseys)  Hill, E. Pritchard, Bowling Alley Pt. (Jerseys)  Hordern, E. D., Cabramatta (A.I.S)  Hurlstone Agricultural High School Glenfield  Kenmore Mental Hospital, Kenmore  Killen, R. L., "Pine Park," Mumbil  Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus)  McSachern, H., Tarcutta (Red Po'l)  McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	 21 9 20 34 41 35 40 88 24 75 68 174 106 43 100 95 100 202 48 95 100	McSweeney, W. J, "The Rivers," Canowindra (Beef Shorthorns) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital Navua Ltd., Grose Wold, via Richmond (Jersevs) New England Experiment Farm, Glen Innes (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., (Beef Shorthorns) Tamworth. (Jerseys) Reid, G. T., "Narrangullen," Yass Robertson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud, Spurway- street, Dundas Trangle Experiment Farm, Trangle Wagga Experiment Farm, Trangle Wagga Experiment Farm, Bomen, N.S.W. Walker Jas. R, "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen Angus) Williams, Chas., Ben Lomond Young, A. H., Rock Lynn," Cudal (Polled Beef Shorthorns)	31 125 80 132 7 16 60 120 120 38 37 86 66 68 88 81 32

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#### THE BEST FLY DRESSING

"DO YOU KNOW THAT 'B.T.B.' IS THE BEST BLOWFLY DRESSING AVAILABLE?"

This is quoted from an article in the Agricultural Gazette of April, 1942 (page 159).

"B.T.B.-15" is the latest Fly Dressing discovery of the Council for Scientific and Industrial Research and was only released after exhaustive tests under laboratory and practical conditions. It is manufactured by GRAZCOS and marketed under the name of

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## GRAZCOS

The Graziers' Co-operative Shearing Co. Ltd. GRAZCOS HOUSE: 46 YOUNG STREET, SYDNEY



#### The Agricultural Gazette.

July, 1942.

## Drift in Dairying.

#### Take Stock Now.

BUTTER factory production figures for New South Wales for the year ended 30th June are not yet available, but it is certain that the total will fall short of the quantity normally consumed—about 848,000 cwt. in 1939-40.

The prospect of immediately increasing production is not promising, and if New South Wales is expected to make any contribution at all to the 70,000 tons required by Britain, then the rationing of butter to civilians (if not to the forces also) appears to be inevitable.

Our per capita consumption of 34 lb. a year, as compared with Britain's wartime 6 to 7 lb. per head per year, certainly leaves room for rationing without hardship. If it becomes necessary to resort to rationing, and people learn to do with less butter and perhaps resort to the use of substitutes, the dairying industry will be the principal loser, as these habits are likely to persist after peace is declared.

An estimate of factory butter production in New South Wales for the year just ended (30th June) is about 750,000 cwt., as compared with 925,000 cwt. for 1040-41, which itself was the lowest for the past decade, and certainly very substantially below the New South Wales peak pro-

duction year of 1933-34, when 1,278,000 cwt. was produced.

In normal years just prior to the outbreak of war, factory output of butter exceeded 1,000,000 cwt. a year. The difference (about 270,000 cwt.) between normal production years and the peak year of 1933-34 can reasonably be attributed very largely to improvement in the pastures due mainly to seasonal influences. In other words, nature has plainly indicated to what extent our dairy land pastures are capable of improvement. It would indeed be a sad commentary on man's ingenuity if it had to be admitted that, given a normal season, the best devised plans and practices for pasture improvement still fell short of what could be achieved by accidental natural influences. Fortunately, this is not a fact. Where pasture improvement has been undertaken in carnest production has far outstripped the best that bounteous nature can provide.

But pasture improvement offers partial solution only of the problem of increasing and stabilising butter production. Improved pastures are not drought proof, although they could largely offset, particularly in good years, the annual "winter drought" experienced in dairying districts. The other main basic stabilising factors are fodder crops and the conservation of feed. In this connection nature again has given some indication of the value to the industry of growing and conserving fodders. In the unfavourable year of 1940-41, when little could be expected from improved pastures, butter production fell about 80,000 cwt. below that of a normal season. This was due largely to inadequate feed during the spring, summer and autumn months. Remarkably, winter production shows only comparatively slight variation in good. normal, and bad years. In other words, "winter droughts" appear to be accepted as more or less inevitable.

The provision of fodders to supplement inadequate pastures will not only stabilise production at (or more likely, above) normal level during the warmer months of sub-normal years, but will also substantially increase winter production in every year.

The present acute shortage of labour, motor fuel, fertilisers, etc., certainly add to the task of

making up the leeway, but they do not make it impossible. If we, and our Allies, must have guns and butter, these seemingly insuperable obstacles must not deter us. More especially, peacetime conceptions of costs in the production of wartime essentials—food or munitions—must not be allowed to assume undue importance. The war must be won at any cost—financially.

#### Rationing of Sulphate of Ammonia to Vegetable Growers.

THERE, is an acute shortage of sulphate of ammonia and the Minister for Agriculture has announced that the supplies available for agricultural purposes will have to be reserved for the production of potatoes and other vegetables. In order to ensure that vegetable crops will receive priority, it has become necessary to control the distribution of sulphate of ammonia, and the Department of Agriculture has been charged with the responsibility of rationing supplies.

All growers of potatoes and other vegetables who require sulphate of ammonia for use prior to arst December of this year must make applications to the Department of Agriculture prior to 31st July. The application forms are now available, and may be obtained immediately from the Department or from Departmental officers in country districts. Fertiliser retailers who require forms for distribution to their clients can obtain them from their wholesale distributors.

On the application form the grower is required to state the quantity of sulphate of ammonia required; the nature and area of the vegetable crop for which it is required; the name of the agent or firm from whom supplies are normally obtained; and whether the crop is being grown under contract to the Defence Food Control Directorate or for ordinary market purposes.

When the application form has been filled in it must be endorsed by a storekeeper, fertiliser agent or an officer of the Department of Agriculture, who will certify that the applicant is known as a

bona-fide vegetable grower. When storekeepers and fertiliser agents endorse application forms they should also state on the forms the name of the wholesaler from whom their supplies are obtained.

The certified application forms may be forwarded by the grower direct to the Department of Agriculture, Box 36A, G.P.O., Sydney, or they may be lodged with the storekeeper or agent for transmission to the Department. All applications will be examined carefully by technical officers of the Department of Variculture, and before an allocation of sulphate of ammonia is made due consideration will be given to the requirements of the crop in relation to local soil conditions and also to whether the fertiliser should be used as a base dressing or for subsequent side dressings When the allocation of sulphate of ammonia has been decided upon the application forms will be classified into trade groups and forwarded to the various wholesale nems for the despatch of supplies to agents and storekeepers. In this way it is hoped to preserve normal trade routine and to minimise treight charges and transport difficulties. The wholesale firms will provide all retailers with a list of growers to whom sulphate of ammonia is to be distributed as well as the quantity to which each grower is entitled.

The sale of sulphate of ammonia except in accordance with the conditions of the foregoing scheme will be prohibited.

#### Contracts Available for Vegetable Seed Production.

The Division of Plant Industry of the Department of Agriculture is desirous of arranging further contracts, on behalf of the Commonwealth Seeds Committee, for the production of seeds of certain vegetables at fixed prices. Interested growers are asked to make contact with the Department. The types of seed for which it is now desired to contract, and the prices which will be paid, are as follows:—

Cabbage—10s. per lb. Lettuce—6s. per lb

Onions (Early White Barletta types)--17s. 6d.

Cauliflower-30s, per lb.

Tomato -- 20s. to 30s. according to variety. Vegetable Marrow -- 2s. 6d. per lb.

Pumpkin—3s. 6d. and 4s. 3d. per lb. according to variety

Cucumber—4s. and 5s. per lb. according to

Any further information as to the varieties of each vegetable required may be obtained on application to the Department, Box 36A, G.P.O., Sydney.

No contracts are now available for the supply of seed of beetroot, silver beet, carrots, parsnips, turnips or mid-season varieties of onions of the Hunter River type.

Help Win the War.—Buy War Savings Certificates.

## Fodder Millet.

An Ideal Crop
For Quick Spring
and
Summer Grazing.



W. D. KERLE, H.D A., Special Agricultural Instructor.

THE provision of green fodder crops from late spring to early autumn is of considerable importance to the stockowner—not only to the coastal dairy farmer who relies on such fodder for continuity of production, but also to the pastoralist in inland areas whose pastures in the summer months, however abundant, are dry and lack succulence. The fodder millets are the ideal crops to grow in spring and summer to provide grazing quickly for all classes of stock.

Apart from their rapidity of growth, they give good bulk, are of high feeding value, particularly for milk production, have no dangerous properties, recover well after grazing, and will make a coarse but very valuable hay. They have proved to be the ideal pioneering crop in inland irrigation areas to provide feed prior to establishing improved pastures.

Fodder millets are not particularly drought resistant, but their chief virtues are their quick growth and high feeding value, which make them the ideal crop to sow after a dry spring or early summer. Frequently dry conditions at this time are followed by good rains and the response from fodder millets under these conditions is outstanding. On coastal dairy farms Japanese millet should enter regularly into the cropping and feeding programme owing to its high milk-producing qualities which are stated to be equal to lucerne.



Japanese Millet at Cessnock.

Sown 11th January, 1941; made excellent hay when cut on 13th March.

Grain was in dough stage and crop 5 ft. 6 in. high.

#### Varieties.

The best known fodder millets grown in Australia may be classified as follows:—

BARNYARD MILLET (Echinochloa crusgalli var. edulis: syn. Panicum frumentaceum). Japanese and White Panicum are the most widely grown. The former is practically the only fodder millet variety grown in New South Wales, and is a very satisfactory variety for all purposes and suited to a wide range of conditions. White Panicum is grown considerably in Queensland where the more tropical conditions suit it. It carries more leaf and makes a better quality hay than Japanese; it does not grow as quickly, but stools and recovers after grazing equally as well. In Queensland it is perennial in habit.

FOXTAIL MILLET (Setaria Italica), of which Hungarian, Giant Setaria and White and Yellow Manchurian are the main varieties. Hungarian millet is grown chiefly for grain for the birdseed trade; it is suitable for fodder, but neither stools as well nor is as hardy as Japanese. It is grown in the north-western districts of this State chiefly. In Queensland it is also known as Dwarf Sctaria or Siberian Millet, while a tall growing strain is called Giant Setaria, Giant Panicum or Liberty Millet. The latter is about two weeks later in maturing. The Giant Setaria can be distinguished from the

Dwarf by examining the lower leaf sheaths when the plants are about 3 inches high, the latter showing a profusion of hairs which are absent in the former. Both these Setarias are grown in Queensland for grain for bird seed and also to some extent as green fodder, the Giant being superior for this purpose. The Manchurian millets are also excellent grain producers, but are not grown to any extent.

MARESTAIL MILLET (Panicum miliaceum), of which White and Red, French Hog or Proso millet are typical varieties. They are not grown to any extent in this State, both Japanese and Hungarian being superior varieties.

PEARL, BULRUSH or CATSTAIL MILLET (Pennisetum glaucum).—Pearl millet produces excellent bulk and is fairly drought resistant, but is much coarser than Japanese and not so suitable for hay. The very hairy nature of the leaf sheaths is a detriment to this variety as a grazing crop, but it is suitable for silage.

Broom millet is not a fodder millet, but is a member of the sorghum family, and should be called Broom sorghum. The use of the word "millet" for this crop, which is merely grown for its fibre head for broom making, is therefore unfortunate and misleading. It is known as broom corn in U.S.A. Like all sorghums, it is liable to cause poisoning if the stock are fed on young growth.

#### Soil and Climate.

Millet will grow satisfactorily in a wide range of soil and climatic conditions. As far as soils are concerned it will grow most luxuriantly on an alluvial loam soil rich in humus, but on clay or sandy loams or red basaltic wheat soils it will produce satisfactory crops, provided sufficient rainfall occurs and that some artificial fertiliser is used on the poorer soils. Although millet is hardy, it can hardly be called droughtresistant, as it requires sufficient soil moisture for best results. It responds quickly to occasional showers, being shallow rooted, and successive grazings are only possible provided rain falls opportunely. grass and the grain sorghums are more drought-resistant than the millets, but there is danger of prussic acid poisoning in feeding these crops prior to heading.

#### Soil Preparation and Sowing.

The millets respond to good soil preparation, and where the crop is to be sown as part of the feeding programme, early and thorough soil preparation as recommended for maize is desirable. Very frequently millet is sown as a catch crop, however, where an early crop of maize, etc., has failed, and on these areas a quick cultivation as soon as the ground can be worked after rain is sufficient, following with the seed, or in wheat districts combining it in the one operation. In some cases where quick green feed is the essential thing, sowing in a dry seed bed is advisable to save time.

The millets are summer growing cereals susceptible to frost damage, and sowings must therefore be made in spring and summer to avoid damage from early or late frosts. Sowing in most districts can take place from September to the end of January, but the time to sow will be regulated to suit the time the feed is required. The best results from millet are obtained in seasons such as has been experienced in recent years, that is, a dry winter and spring. On the first substantial fall of rain in spring, sow Japanese millet, and if this is followed up by reasonable summer showers, luxuriant green nutritious fodder will be available in a shorter time than with any other crop.

The seed may be broadcasted by hand or seed sower, or with wheat-seeding machines either through the seed or fertiliser box, or the grass or lucerne seed box attachment, sowing through every run. Hand sowing is usual in coastal districts, sowing from 12 to 15 lb. per acre. Under good soil and rainfall conditions the stalks are inclined to be coarse, and even heavier seeding is practicable. In districts where wheat drills or combines are available, the seed may be sown by mixing it on the morning of sowing with superphosphate and sowing through the fertiliser box, with manure rates varying from 56 to 112 lb. per acre according to requirements. If superphosphate is not necessary, as in some districts. the seed can be mixed with sawdust and sown through the fertiliser box or it may be sown through the seed box by attaching leather strips in each hopper to steady the run of the seed, setting the drill to sow at the lowest rate (26 to 35 lb. wheat per acre). If a lucerne or grass seed box is

available, sowing can be done very satisfactorily with this attachment. In the safe wheat districts from 8 to 10 lb. of seed is required per acre, but this should be reduced to 5 to 6 lb. in the drier districts. Under irrigation seed can be increased to 10 to 12 lb. per acre.

A firm seed bed is necessary, and the best depth to sow is from 1½ to 2 inches. The



Japanese Millet Four Weeks from Sowing.
Sown at 20 lb per acre with rewt superphosphate,
rt inches of rain since sowing

seed should be covered with the trailing harrows when using wheat-seeding machine, and light harrows in coastal districts.

fodder purposes the Japanese is recommended for all districts. Very great care must be taken to secure pure seed. The most likely impurities with Japanese millet are Sudan and Johnson grass, both of which will cause poisoning in stock. Mortality in stock occurred last season to dairy cattle at Denman through this cause. It is a very dangerous practice also to sow millet where sorghum was grown the previous year. In coastal districts sorghum is usually sown to provide late autumn and winter fodder, the crop remaining in the paddock until the grain is quite ripe. This means that self-sown sorghum must appear here in the spring. and to sow millet on these paddocks is only courting disaster.

In recent years in Central Coastal districts, the black beetle has played havoc in early sown maize crops. It is almost impossible to sow maize now before the middle of November owing to this pest. This is a serious matter on coastal farms where maize is relied upon for green fodder. Fortunately, however, the beetle shows no

liking for Japanese millet, and dairy farmers are able to sow this crop with impunity within the danger period for maize. As it has high milk-producing qualities it is therefore invaluable in these districts.

Millet, being a quick growing, shallow rooting plant, is benefited by the application of artificial fertilisers. In wheat districts from ½ to 1 cwt. superphosphate is recommended, up to 1½ cwt. on inland irrigation areas, and on the coast a 2:1 mixture of superphosphate and sulphate of ammonia applied at the rate of 1 to 1½ cwt. per acre depending on soil quality.

#### Utilisation of Millet.

The fodder millets may be utilised for (1) grazing; (2) as green fodder or silage; and (3) for grain. Undoubtedly their chief value is for grazing owing to their quick growth, high carrying capacity, duration of grazing period, high feeding value and absence of danger from prussic acid poisoning. Varieties such as Japanese are very suitable for grazing for all classes of stock.

Under favourable weather conditions Japanese millet can be grazed six weeks, or often earlier, after sowing, and a crop can be sown and harvested for hay or green



A Dense Crop of Japanese Millet at Singleton. Cut for silage, yielding 17 tons greenstuff per acre.

feed in under three months. One of its main features is that there is no danger of prussic acid poisoning by grazing the young growth, and also that the danger of hoven associated with grazing lucerne and clover does not occur with millet. Furthermore, it has astringent properties, and does not scour cattle as young succulent growths frequently do.

#### Graze often and Stock Heavily.

The first grazing of millet must be made before the crop is any height, as if it is allowed to grow too tall before grazing the recovery is poor. On the coast, where the moisture conditions are usually good, better recovery after grazing occurs than in inland districts, but here also it must be first grazed before reaching any height. recovery powers of millet after grazing are quite satisfactory, but are nevertheless entirely dependent on favourable weather conditions. If moisture is deficient, millet will not withstand heatwave conditions, and under these circumstances possesses a poor power of recovery. Sudan grass is better in this respect and is, in fact, generally more drought resistant than millet. Although Japanese millet will provide successive grazings it diminishes in bulk as the season progresses. This shows the advisability of successive sowings, particularly on the coast, for dairy cattle to provide a continuity of green fodder.

irrigation in inland districts Under Japanese millet is a valuable fodder crop, but to make the most efficient use of it for feeding over a prolonged period it must be kept heavily grazed. The bulk of fodder produced under irrigation conditions has an enormous carrying capacity, but recuperative powers are negligible, whereas continuous heavy grazing enables a much extended usefulness of the crop. If it is not heavily enough grazed millet will run into head and cease to grow, hence the necessity for continuous and heavy stocking, to prevent the crop exceeding a height of 6 to 8 This is much better controlled if successive sowing of relatively small areas are made in preference to large areas which may become unmanageable.

#### Making Millet Hay.

For hay, green feed or for making into silage, millet should be cut when it is in head and before the grain is well formed, but the stalk sappy and the leaf quite green. It is better to err on the early side rather than to allow the crop to become too advanced. This is particularly so if any considerable area is being made into hay or silage as it ripens so quickly that the quality will rapidly deteriorate if cutting is not commenced early. The crop is harvested with the mower and rake, or reaper and

binder. Japanese millet has a rather coarse, pithy stem, and is therefore considerably more difficult to make into hay than wheat or oats, requiring much longer in the stook. Good haymaking weather materially assists in curing, which must be thorough or heating in the stack will occur.

Millet hay is coarse, this coarseness increasing with the lateness of cutting, and is influenced considerably by the thickness of the stand, and also by the quality of the soil and weather conditions experienced during growth. Although in quality it is inferior to wheaten and oaten hay, it is nevertheless a very useful fodder to have in reserve. It should be chaffed and fed in conjunction with other hay, such as wheaten, oaten and lucerne, for the best results. The yield of hay varies from 1 to 3 tons per acre in inland districts, and of green fodder from 10 up to 20 tons per acre under favourable weather conditions in coastal districts.

#### Harvesting for Grain.

Millet, usually the Hungarian variety, is regularly harvested in some districts in this State for grain for the bird-seed trade. Occasionally after grazing for some time, favourable weather having produced ample natural pastures, Japanese millet sown for fodder is allowed to mature grain. Harvesting grain of these millets can be satisfactorily done with the wheat header or harvester. Adjustments are necessary to avoid loss in harvesting—the blast should be practically eliminated and the wheat riddle or riddles used, the top one being placed upside down and sloping to the outside with tongues facing the front of the machine. The shake is reduced to a minimum. There is usually some loss in harvesting, which can be reduced to a minimum by harvesting with reaper and binder and threshing with stationary header. To clean millet seed thoroughly, winnowing or sieving is advisable after header harvesting.

Grain yields vary considerably, but should be in the vicinity of 10 to 12 cwt. per acre. Millet grain is very small, but can be fed to sheep in feeders with other fodder. It is not satisfactory for horses in which it is said to affect the kidneys and to cause swelling of the joints and lameness. They should therefore not be fed the seed or grazed on areas on which ripe millet seed is present in any quantity, such as may occur in stubble after a crop has been cut for hay, etc. It is considered advisable also for millet hay to consist of only about one-third of the hav or chaff ration for horses.

#### Effect of Millet on Succeeding Crop.

Millet is often thought to have an adverse effect on the succeeding crop, but if this occurs it is due to depletion of moisture and not to its effect on plant food. If good rains in late summer or early autumn replenish the moisture content of the soil, the influence of the millet crop on the following winter cereal crop is not noticeable. If the millet sowing is made early and grazings are not carried too far into the summer months, the effect would be reduced to a minimum. A crop which is grazed during summer and then allowed to go for hav or to mature seed must naturally deplete

the soil of moisture to a greater extent than crops which are grazed for a comparatively short period. In coastal districts an early sown millet crop could with advantage be followed by cowpeas sown at about the end of December and ploughed under in autumn.

#### Diseases and Insect Pests.

So far fodder millets are not seriously affected by fungous diseases or insect pests in this State. Hungarian millet (Setaria italica), however, is subject to attack by a smut disease carried by the parasitic fungus Ustilago crameri. This disease is common on Pigeon Grass (Setaria glauca) which is a closely related species, and may become of economic importance on Hungarian millet. The disease can be controlled by dusting the seed with copper carbonate, Agrosan or Ceresan, at the rate of 2 oz. per bushel.

#### The Breeding, Care and Training of Sheep Dogs.

A VALUABLE addition to Australian literature on sheep dogs is Dr. R. B. Kelley's Animal Breeding, and the Maintenance and Fraining of Sheep Dogs (Augus and Robertson, Sydney).

Into the 160 pages of this well illustrated book, Dr. Kelley has crammed a wealth of knowledge, which is easy to digest because of simplicity of style and freedom from technical terms and padding.

Chapters are devoted to breed, origins and characters; the mechanism of inheritance; physiology and technique of mating; selection; mating practices and beliefs; planned breeding; application of breeding plans to sheep and other domestic animals; ante-natal treatment; management at birth; weaning and rearing; adult dogs; kennels and accommodation; several afflictions; the gregarious habit and preliminary training; the hunting instinct and first flock exercises; control by signals; the cast; driving, barking and general considerations; special kinds of sheep dogs; trials and special training. An adequate index adds to the value of the book as a work of reference.

Animal Breeding and the Maintenance and Training of Sheep Dogs has one slight shortcoming—its title. It might lead the prospective reader to expect more on the subject of animal breeding generally, whereas, in fact, the principal subject is the dog. However, the author points out that most of the biological discussion is applicable equally to all domestic mammals, and he has devoted a chapter to explaining how the principles and plans discussed are applicable to the breeding of sheep and other domestic animals.

If the book sells on its merits, Dr. Kelley will achieve both the objects uppermost in his mind when he decided to write this book—to raise money for war funds, and to promote a greater understanding of the working sheep dog, which is doing a better job than ever to-day, when so many men from our sheep country are serving with the fighting forces.

While the war lasts Dr. Kelley is generously donating all earnings from his book to war funds. The price is 10s. 6d. plus postage.

War Gossip is Dangerous.

Guard Your Tongue.

## The Branding of Cattle.

### Practical Hints-Legal Requirements.

B. C. VEECH, B.V.Sc., District Veterinary Officer.

ALTHOUGH the branding of cattle is not compulsory in New South Wales, the publicity given to suggestions and plans for the movement of stock in an emergency has created among stockowners a wider interest than usual in branding.

The benefits of owning a registered brand, the requirements of the law, and the practical aspects of branding are dealt with by Mr. Veech in this article.

Branding or ear-marking is recognised as the only practical way to establish the identity (or ownership) of cattle. To prevent duplication of brands and to give legal protection to stockowners most countries have passed brands acts, which require the registration of all brands. These acts, as in the case of the New South Wales act, specify, among other things, the sizes of brands to be used and their placement on the animals. Penalties are prescribed for the use of an unregistered brand and for the use of the registered brand of another owner without his permission. It is also an offence to disfigure, alter or deface a registered brand.

#### Reasons for Branding Cattle.

The chief object in branding cattle is to establish ownership, but, in addition, they are often branded with numerals, signs or letters for (a) stud herd records, (b) when the owner requires a brand for age or culling purposes, and (c) where cattle are branded for disease control. Again, the brand of a cattleman is the trade-mark of his line of production. The most successful cattle breeders take pride in their brands and make every endeavour to maintain or improve the high standard of quality in the cattle which carry those brands.

#### Types of Firebranding Irons.

Branding-irons in use in the Commonwealth are of many general types to comply with the branding acts in the various States. They are generally made of iron, but copper is also satisfactory. Brand handles should be fairly long, straight, and not too heavy. New South Wales regulations require that where the brand comprises a letter or letters, conjoined letters, or a numeral or num-

erals, or any combination of these, each of such letters, conjoined letters or numerals, shall not be less than 1½ inches nor more than 3 inches in height, measured in their normal posture, and the letters, conjoined letters or numerals forming the brand shall not be less than half an inch apart.

Again, in New South Wales, where the brand wholly or in part consists of a sign or character, such sign or character shall be not less than 1½ inches nor more than 3 inches in its greater width or length, and shall be separated by not less than ½ inch from any letter, conjoined letter, numeral, sign or character, forming part of the brand, and in any such combination the size of such letter, conjoined letter or numeral shall be as provided above. Where the Registrar of Brands is of the opinion that the size of any brand is not provided for in the Act, he shall determine the size of such brand.

#### Order and Position of Branding.

The order and position of branding cattle, as specified by the Brands Act, 1923, is as follows:—

Portion t (1st brand) embracing the left rump. Portion 2 (2nd brand) embracing the left hip. Portion 3 (3rd brand) embracing the left thigh. Portion 4 (4th brand) embracing the right rump. Portion 5 (5th brand) embracing the right hip. Portion 6 (6th brand) embracing the right thigh.

#### Application of the Firebrand.

The best method of firebranding cattle has been a much discussed question in all cattle-raising countries. The damage done to hides by faulty and incorrect methods of branding is not yet fully realised by some cattle owners.

Whatever method of branding is adopted the best results cannot be secured unless the branding iron is properly heated and the correct touch exercised by the person doing the branding. A good fire is essential, but it is not wise to heat brands in a forge, as they are likely to become too hot, resulting in their branding surface becoming burnt and rough. Branding irons must be used when really hot, otherwise much time is wasted, the animal is caused unnecessary pain and a faulty brand results. Judgment secured through experience will lead to good branding.

The correct touch is most important, as the skin should not be burnt through; deep branding is both cruel and unnecessary. If the surface of the skin is just scorched, the brand usually peels off and remains distinct. A nicely-heated, good-shaped branding tron should be lightly, quickly and evenly applied for about one second without undue pressure.

Don't hesitate when applying the brand, for if the hot iron is held a short distance off the beast's skin it will most likely cause the animal to struggle. Avoid placing the brand on the skin a second time, as it generally results in a bald scar, and often the brand cannot be put in exactly the same place twice, and so a blotched brand results. It is wise not to use more than one branding iron if possible, but to incorporate the complete brand on one iron. This saves time and gives better results than when two irons are used.

The beast should not be branded when the skin and hair are wet with sweat or rain, or when the skin is twitching or contracting. (lipping off the hair and smearing (with fat) the area to be branded are recommended, provided the operator knows his job; otherwise disastrous results may result. The face of the branding iron must be kept free of burnt hair; this can be done by rubbing it on the ground after branding the beast.

Unless the animal is lying in the correct position when the brand is applied, it will most likely be found when he gets up that the brand is too low down or too high up. It is well to remember that young cattle should be branded higher up than old cattle. Where possible, a small-sized brand should be used for calves. A good brander will always see that his branding irons are in

good order by keeping their edges even and fairly sharp. Animal fats or raw linseed oil are good to apply to a firebrand after branding is completed.

#### Age of Branding.

While cattle may be branded at any age, the general practice among cattlemen is to brand calves before they are weaned at about three months. Losses from straying calves will be lessened if branding is carried out at the earliest opportunity. It is well known, of course, that in parts of Australia branding at a much later age is the practice, but man-power and seasonal conditions are the chief deciding factors. Cattle which change ownership are usually re-branded, although it is remarkable how many small cattle owners fail to re-brand cattle purchased.

#### "Casting" or "Throwing" Method.

Broadly speaking, there are three general methods used in branding cattle; namely, (1) "casting" or "throwing", (2) race or crush, and (3) the chute.

"Casting" or "throwing" is used at times in the open where the cattle are held together by stockmen, calves are lassoed, thrown and then branded. In some instances, chiefly with females, they are branded standing. In yards, the calves are separated from the cows and driven into smaller yards. Here the calves are thrown by hand, the smaller ones being "flanked," i.e., grabbed by the flanks and forelegs and thrown on their sides on the ground, and the larger calves "mugged" down. One man usually places a hand on the calf's muzzle, and with the other hand on the ear, pulls the head upwards and around towards the opposite side, thereby throwing the calf to the ground, with or without an assistant on the tail or hind leg. Once the call is thrown to the ground, either by "flanking" or "mugging," one man grabs the upper foreleg, and, sitting on the ground, pulls it forward, at the same time pushing the other foreleg backwards with his feet. Another man, pulling the upper hind leg backwards while sitting on the ground, presses the lower hind leg forward with his feet and, in this way, these two men stretch the calf on the ground for branding. This is a quick and easy method of branding, marking and castrating calves.

#### The "Bull-dogging" Method.

The "bull-dogging" method, too, is often used with varded calves. One man catches the hind leg low down below the hock with one hand, and higher up with the other hand, and pulls the calf backwards, while another man grabs the foreleg low down on the same side, and the two men, pulling and lifting together, throw the calf to the ground on the opposite side to that required for branding. This is a quick method of "casting" calves of a suitable age, but the men engaged in this work must know their jobs, or else the pace at which the calves are thrown will be considerably reduced, and the work become tiresome

#### Branding in Races or Crushes.

In Australia cattle are often branded in crushes or races Provided the facilities are good this is a convenient way of branding, especially if the cattle are wild, strong, and older than the calf age, and the amount of help available is limited. It has one disadvantage, however, in that at times the cattle are liable to be carelessly branded, chiefly because they are not always in the best position for the correct placing or application of the brand.

#### Branding in a Chute.

This method of branding is, perhaps, the least used in Australia, although extensively used in America. Its admirers claim that it

has many advantages over the previous two methods mentioned, especially with cattle from the yearling age upwards. It is claimed that the work is easier, quicker, less likely to injure the cattle, and causes little disturbance among the cattle.

When making a chute for holding cattle it is especially desirable to have one side movable so that the animal can be held comfortably under pressure, and without injury, against the side of the chute. branding chute so constructed is also known as a cattle "squeeze." This type of chute, apart from being useful in connection with branding, also has an advantage over the ordinary chute where castration and vaccination are to be effected, since the beast can be held more firmly.

#### Hides Damaged by Faulty Branding.

It is estimated that the economic loss in hides, due to faulty branding and to branding on valuable portions of the hide, is considerable. The usual practice is to brand cattle high up on the rump, as, from the cattleman's point of view, it is a good branding surface and can be easily seen from the horse or the rail of the stockyard. Unfortunately, it is the worst position from the tanner's point of view, as it damages the most valuable portion of the hide. Branding on the back and loin also causes great economic loss in hide values.

#### Value of Calcium in Sheep Licks.

Mr. MAX HINRY, Chief, Division of Animal Industry, points out that the experimental work in various parts of Australia is modifying views on the uses of licks for sheep and is emphasising the value of calcium. The Department has, in the past, advised stockowners that in certain circumstances bonemeal (which contains calcium phosphate), or calcium phosphate, was a useful addition to the salt lick, and there was not wanting field evidence to support the action. It was considered that both the calcium and phosphorus were of value Work in South Australia, however, has indicated that the phosphorus portion is not important, and this suggests that any beneficial result observed in the field was probably due to the calcium.

I speriments in the northern tablelands of New South Wales fulled to show any benefit arising from the use of calcium phosphate when the sheep were grazing on natural or improved pastures, but recent work at Sydney University showed that the use of calcium carbonate in the form of ground limestone, was of great benefit with sheep fed on cereal grains. This again indicated that it is the calcium in these licks which is beneficial. This benefit from calcium is apparently the reason for the commonly recognised value of lucerne and clover hay, which contain a higher percentage of calcium than grasses and cereals.

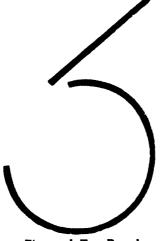
The Department has, in the past, endeavoured to point out that the routine use of lick mixtures is not justified. Information is steadily being accumulated to show exactly the conditions under which their use is of benefit.

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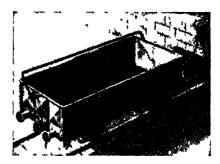
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S. R. NICHOLAS, Acting Secretary for Railways.

# Pregnancy Diseases of Sheep.

#### PREGNANCY TOXAEMIA AND HYPOCALCAEMIA.

#### Diagnosis, Prevention and Treatment.

G. L. McClymont, B.V.Sc, Veterinary Officer.

PREGNANCY toxaemia and hypocalcaemia, the two most serious diseases to which ewes are subject, are continually, and not unexpectedly, presenting problems of differentiation, prevention and treatment to the sheep owner. As the diseases are similar in many respects and can occur under somewhat similar conditions, the following brief review of each disease, with emphasis on points of difference, should prove of value.

#### Hypocalcaemia.

This disease is also known as milk fever, grass staggers, grass tetany and lambing sickness. The conditions under which it is likely to be encountered are many, but the following basic factors are usually to be found:—

- (1) A sudden change to lush grazing conditions, as experienced after heavy rains or when sheep are turned out to feed on wheat or oat crops. Severe outbreaks have been noticed on winter herbage after drought-breaking rains in the north-west.
- (2) A sudden check to feeding as is incurred with shearing, road or train journeys, bad weather, etc. (Driving will precipitate cases of the disease. It is often noticed that under conditions favourable to the appearance of the disease no trouble will be experienced until the ewes are driven, when cases may occur within a couple of hours.)

#### In-lamb and Milking Ewes Affected.

The type of sheep affected is practically always the in-lamb or milking ewe. Cases occur at any time from six weeks before to ten weeks after lambing. Young ewes are usually not as susceptible as older ewes, and up to 30 per cent. of the flock may be affected, although about 10 per cent. is usual.

#### Symptoms of Hypocalcaemia.

The symptoms of hypocalcaemia are fortunately rather distinctive, the first abnormality being that the sheep develop a curious stiff, stilted, or proppy gait in either the hind legs or all four legs, will not move about, and if compelled to move will tremble and shiver while in motion. Drowsiness develops and the ewe eventually goes down. A characteristic position is usually assumed, the ewe lying on its chest, the hind legs straddled out behind, and the neck and head stretched forward with the lower jaw testing on the ground. A discharge from the nostrils is often noticed about this time. Drowsiness passes into insensibility, and death often takes place within four to six hours of symptoms developing, although some cases may linger up to twenty-four hours and even forty-eight hours. Usually 90 per cent. of the affected animals die unless treated.

#### Post Mortem.

On post mortem there is little to be seen. The bible (omasum) is often contracted to half its size, there may be hard lumps of ingesta in the large intestine with a clear jelly-like mucous material between them, harmorrhages may be noticed in the heartwall, and the paunch (rumen) is usually bloated.

#### Treatment of Hypocalcaemia.

If a blood analysis is made of affected sheep, a most significant finding is that the amount of calcium in the blood is greatly reduced, even to one-third of its normal amount. This lowering of calcium is due, not to deficiency of calcium in the feed, but to some mechanism which, although not as yet completely understood, is connected with the sudden changes in feed. As all the symptoms of the disease are directly traceable to this fall in blood calcium, the remedy is obvious—injection of calcium salts. If

the condition is diagnosed early, losses can be practically eliminated. The stock solution for injection is prepared as follows:—

Mix the powders to a paste with cold water, add the rest of the water, and boil to dissolve the materials and sterilise the solution. Use 20 cc. for each ewe, injecting it subcutaneously into any of the usual vaccination sites, such as behind the shoulder or inside the thighs. Massage the area of injection to speed absorption.

Some cases do not respond to this injection, but may respond to one containing some magnesium salts, the solution for injection being prepared by mixing 20 cc. of the above solution with 10 cc. of a 10 per cent. magnesium sulphate solution prepared as follows:—

Magnesium sulphate (epsom salts) 2 oz. Water ..... 1 pint

When milking ewes are affected, udder inflation, as used on cattle with milk fever is effective. The special pumps and teat syphons as used on cattle are excellent for the purpose, but in an emergency a bicycle pump, fitted with a bicycle valve (with the rubber removed) as a syphon, is quite use-When the cattle outfit is used, the pump and syphon should be sterilised before use by boiling for twenty minutes. If using the bicycle pump, do likewise to the valve and the metal parts of the pump. The teat should be wiped with methylated spirits. Do not strip out the udder before injection, massage the udder while pumping, do not overdistend the udder with air, and, when pumping is completed, prevent escape of air by pinching the teat orifice; tying with tape is unnecessary. Recovery is usually complete within one or two hours, but if no improvement is noticed within this time, both treatments may be repeated. Prenching with molasses appears to be of value at times.

#### Prevention of Hypocalcaemia.

As man has little control over many of the circumstances which are likely to result in outbreaks of hypocalcaemia, such as bad weather, or succulent feed after drought, prevention of the disease is often a rather difficult matter. However, the following points should be observed in the management of in-lamb and milking ewes:

- 1. When ewes are first grazed on green succulent feed, as sown crops, they should only be allowed in the paddock for short periods of the day, and then after having been fed roughage beforehand; and where rain has brought a sudden flush of feed, distribute roughage to the ewes. This action will eliminate sudden gorging on the new feed.
- 2. Reduce all periods of fasting as are necessitated by mustering, droving, yarding, etc., to a minimum, especially when handling ewes which are not in good condition.
- 3. Handfeed during weather likely to drive sheep off their feed.
- 4. Avoid driving ewes which are existing under circumstances liable to predispose to the disease.

#### Pregnancy Toxaemia.

This disease is also known as twin lamb disease and pregnancy disease.

Ewes in two opposite conditions are affected—ewes over-fat and without sufficient exercise, and ewes with insufficient feed and losing condition as lambing approaches.

Most of the ewes which are affected are those from one to six weeks off lambing and carrying twin lambs, so that British breeds are more commonly affected than Merinos. This feature of twins being commonly associated with the disease leads to the common name of "twin lamb disease," although twins are by no means a constant feature of all cases.

#### Symptoms of Pregnancy Toxaemia.

Usually the first signs of the disease are that ewes in lamb are found standing apart from the main mob, appear dull and off feed, and if pursued show no interest and evince little fear of man or dogs. If forced along the ewe will move away slowly with a staggering gait. Some sheep in the early stages wander aimlessly about, walking into drains or fences, and stand with their heads pressed against fences or held near the ground, often for hours on end. Constipation, lack of appetite and grinding of the teeth are commonly noticed.

When the ewe goes down, she may be in a normal sitting position, sometimes with the head around to the flank, or lying on her side. Convulsions may occur, and the

animal goes into a long stage of semi-consciousness which may last several days before death, which usually takes place between four and six days after symptoms are noticed. In the more violent cases the ewe, without showing any earlier symptoms, falls insensible to the ground and dies in a short time, perhaps with convulsions.

#### Post Mortem.

The findings at post mortem are extremely typical, the liver being somewhat enlarged and pale yellow or greyish in colour, the kidneys perhaps pale, the intestines empty, the lower bowel filled with hard dry material, and usually twin lambs in a normal uterus. The condition of the ewe is usually either poor or over-fat.

#### Treatment of Pregnancy Toxaemia.

The exact nature of the disease is at present uncertain, a host of theories having been advanced and investigated, but it is known that the disease is related to a disturbance in the utilisation of sugars by the ewe. Treatment, unless undertaken in the early stages, is mostly disappointing. The most successful treatment to date has been the use of drenches of large quantities of molasses or sugar and water, 12 to 1 lb. of sugar being given in a pint of water. With most ewes great care must be taken with drenching as the swallowing mechanism may not be functioning perfectly, and some fluid may enter the lungs, causing pneumonia.

Subcutaneous injections of 20 per cent. glucose solution in amounts up to 50 cc. may prove of value, especially for ewes unable to swallow. The solution is prepared as follows:—

The presence of constipation in the affected ewe indicates the need for laxatives, and treacle and molasses have been found suitable. Epsom salts have not given good results.

#### Prevention of Pregnancy Toxaemia.

On account of unsatisfactory results of treatment, prevention is doubly important with this disease, attention being directed to the following points:—

(1) If the feed is failing, handfeed so that the ewes at least maintain condition

as lambing approaches, and, if they are poor, feed so that condition is improved.

(2) If the feed is good, and the ewes are fat and not obtaining sufficient exercise, driving daily for an hour or two will prevent the onset of the disease or halt losses if cases have appeared.

(3) Avoid any sudden changes of feed from good to poor, or vice versa, as lamb-

ing approaches.

(4) Vary the diet if handfeeding, and feed in different places each time so that the ewes will be forced to exercise.

#### Differential Diagnosis.

Where ewes are dying, and it is uncertain which disease is causing the trouble, ask yourself the following questions:—

Are the affected ewes—

- (a) In lamb and milking; or
- (b) only in lamb?

Have the ewes--

- (a) Suffered some sudden check to feeding or had sudden access to succulent feed; or
- (b) lost condition as lambing approaches or become too fat?

Did the ewes-

- (a) Go down, assume a straddled position of the hind legs with the neck stretched out, and die mostly within twenty-four hours; or
- (b) stand "dopily" about, go down sitting or lying on their sides for some days before dying?

Is the liver—

(a) Normal in appearance; or

(b) enlarged and yellowish or greyish in appearance?

Are there, on post-mortem—

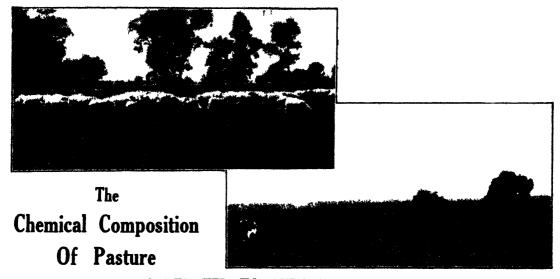
- (a) Mostly single lambs; or
- (b) mostly twins?

Did affected ewes—

- (a) Respond to calcium injections; or
- (b) fail to respond to clacium injections, but early cases respond to drenches of sugar?

If the answers are mostly "Yes" to (a) the disease is probably hypocalcaemia, and if mostly "Yes" to (b) pregnancy toxaemia.

Where diagnosis is in doubt no harm would result from trying both lines of treatment, but the advice of the Stock Inspector should be sought immediately. But, remember with both these diseases (as with most other diseases), an ounce of prevention is worth many, many pounds of cure.



#### AS RELATED TO ANIMAL NUTRITION.

(Continued from page 267)

A W MILES, BSc, ASTC, Chemists Branch

#### Composition and Nutritive Value of New South Wales Pastures.

THE pastures of New South Wales show considerable variation in chemical composition and feeding value. This portion of the article gives data for typical natural pastures throughout the State, and indicates where deficiencies are likely to occur.

It is widely known that where is stock do well in all seasons on some pistures on others their productivity falls, or they become unthrifty, at certain times of the year even though there may be an adequate quantity of feed available. This difference in condition is usually due to the quality of the pisture—the poorer pastures being low in digestibility and supplying too little of the valuable constituents such as pretein cirbohydrate and the mineral matter contained in the ash. This variability in feeding value may be seen from the tables given below which show the chemical composition of the total pictures of some districts of the State. The data have been collected by various members of the statts of the Chief Chemist and Chief Akiostologist.

#### Northern Tablelands.

Typical results for the composition of natural pastures on the poorer granite soils of the Northern Tableland district at different seasons of the year are given in Table 4

The amounts of soluble as protein and phosphoric teid in these pastures although higher in spring than in winter are low in all seasons. The feeding value is so low that in spite of good rainfall, such pistures are suitable only for wool production even in the hardy. Meximo on some of this country there is evidence of nutritional disorders.

Table 4 Composition of Natural Pasture on Look Granite Soil near Guyra \*

~~			··· ·· ·· ·	<del></del>
Season	Soluble Ash	Protein	Line	Phosph ri Acid
	!	,		
Autumn 1035 Winter 1735 Spring 1735 Winter 1736 Spring 1036 Winter 1737 Spring 1037	Per cent 19 15 28 16 20 4t	Per cent 57 46 71 (1 77 83 94	Per cent 0 53 0 48 0 55 0 45 0 37 0 61 0 46	Per cent

\* Percent is a capr said on moisture free basis

In the same district however there are better soils, on which a somewhat more nutritious pasture is established. The figures shown in Table 5 are typical of the medium quality hill pastures of the Glen Innes district, consisting of Kangaroo (mass (Themeda australis), Native Sorghum (Songhum plumosum), Parramatta Grass (Sponobolus indicus), Red Grass (Bothriochloa deceptions) with smaller amounts of Tussocky Poa (Poa caespitosu)

IABLE 5 -Composition of Pasture on Clay Loam at New England Fyperiment Farm \*

					-		
Season	Pro- tem	I ibre	I at	Ash	Car- bohy drate	I ime	Phe s- phore Acid
					1		
	Per	Fei	Per	Per	Per	Per	Per
<b>6</b>	cent	cent	cent	cent	cent	cent	cent
Summer	78	29 5	20	107	19 I	0 43	0 39
Autumn	9 3	284	2 9	11.3	481	0 42	0 43
							-

\* Percentages on moisture free basis

These analyses show that this pasture has a higher content of phosphoric acid than those referred to in Table 4, but in other respects the two sets of analyses are similar.

#### North Coast.

In the far North Coast district, where large areas of pasture are devoted to the dairying industry, the pastures consist mainly of Paspalum with varying amounts of White Clover. The composition of a pasture typical of this district is shown in Table 6.

Table 6.—Average Composition (three analyses) of Paspalum dilatatum-White Clover (Trifolium repens) Pasture at Wollongbar Experiment Farm ("Big Scrub" country).\*

Season	Soluble Ash,	Protein	Lime.	Phosphoric Acid.
Spring Summer .	Per cent. 7'4 6'1	Per cent. 15.7 11.2	Per cent. 1 17 0 72	Per cent. 0.44 0.39

<sup>\*</sup> Percentages on moisture-free basis

These analyses show that this pasture is high in protein, lime, and soluble ash. The amount of phosphoric acid, however, although higher than in the pastures of the Northern Tablelands, falls short of the optimum required by the heavy yielding dairy cow. It should be noted that the amounts of protein and other nutrients are higher in spring, when the pasture generally contains more White clover than in summer, when it consists principally of paspalum.

#### North-west.

The black soil plains in north-western New South Wales constitute a big area of country with a fairly uniform collection of pasture species, mainly Mitchell Grass (Astrebla lappacea) and Flinders Grass (Iseilma membranacea), with Burr Clover (Medicago denticulata), Woolly Burr Clover (Medicago minima) and other "herbages." Table 7 shows the average composition of such a pasture.

Table 7.—Average Composition of Pasture on Heavy Grey-black Soil at Burren Junction.\*

Season.	Protein.	Asb.	Carbo- hydrate	Fibre.	Fat.	Lime.	Phos- phoric Acid.	No. of Analyses.
August, 1938 April, 1939 . September, 1939. January, 1940 July, 1940	Per cent. 25.0 19.9 11.4 9.5 9.9	Per cent 15.5 13.5 9 2 10.0 11.8	Per cent. 35.5 36.0 47.6 38.1 42.3	Per cent. 20 4 27.4 29.6 41.6 34.7	Per cent. 3.6 3.2 2.2 0.8 1.3	Per cent. 1 72 0 79 1-55 1.15 1.02	Per cent. 0.98 0.55 0.53 0.30 0.27	\$ 4 5 3 5

<sup>\*</sup> Percentages on moisture-free basis.

The nutritive value of this pasture was particularly high in August, 1938, and April, 1939, after satisfactory rains. The lower values for 1940 were

due to drought conditions. It appears that variation of pasture composition in this district is not so much due to the season of the year as to the rainfall, the pasture being succulent and nutritious after good rains, but declining in feeding value as it dries off.

In the first two cuts, the amounts of protein, lime and phosphoric acid are adequate for the heaviest demand which might be made upon them by all classes of grazing livestock, and the fibre content is low, indicating high digestibility. In the following cuts, the protein and phosphoric acid content is lower and the fibre content greater. The pasture was lowest in feeding value in January, 1940, when a high fibre content (41.6 per cent.), indicating low digestibility, occurred, together with low phosphoric acid and protein content. At this stage, the pasture appears to be adequate for the smaller needs of the mature sheep, but does not provide the optimum amounts of nutrients for the growing lamb or the nursing cwe.

#### South Coast.

The following table gives the composition of a good type of pasture in the Illawarra dairying district. The pasture consisted mainly of a mixture of Paspalum and White clover, with some Perennial Rye grass, established on second-class adluvial land. The high quality of the pasture is mainly due to cutting at the 3- to 4-inch stage of growth. No fertiliser was applied to these plots.

ΓABLE 8.—Average Composition of Pasture at Berry Farm.\* (Analyses C. M. Donald)

Season.	Soluble Ash.	Protein.	Lime.	Phos- phoric Acid.	Number of Analyses.
	1	!	<u> </u>	<u>'</u>	
	Per cent.	Per cent	Per cent.	Per cent	1
Autumn, 1932	6.1	11'4	0.04	0 49	Y
Spring, 1932	68	102	0.70	0.06	2
Summer, 1932-3	4.8	15.2	0.04	0.59	4
Autumn, 1933	73	24 1	I 35	0.69	2
Winter, 1933	7.3 8·2	28.0	1.58	0.75	2
Spring, 1933	82	20.8	1.38	0.75	3
Summer, 1933 4	71	22-1	0.93	0.75	2

<sup>\*</sup> Percentages on moisture-free basis

The feeding value of this pasture, as shown by the analyses, was good throughout the two-vear period. The large increases in lime and protein content during 1933 were due to the increased amount of White clover in the pasture. This development of White clover was brought about by management practices which encouraged its growth

Further south, the pastures are generally poorer than in the Illawarra district, although there is much variation and some very good pastures may be found. The range of variation may be seen in Table 9.

The feeding value of the pasture from the first two localities is, as may be seen from the analyses, fair to good, whilst in the last two it is very poor; mineral deficiency (pica and o teomalacia) has been common in dairy cattle grazing on such unimproved natural pasture.

TABLE 9.—Pasture Composition in the South Coast
District (Nowra to Moruya) \*

I ocation and Nature of Pasture	Season	Soluble Ach	Lime	Phos- phoric Acid	Protein.
		Per cent	Per		Per
Nowra-	1	1		ł	1
Paspalum, White cloves	Spring	5.6	0 54	0 43	134
with some couch, grow- ing on brown sandy loam	Autumn	4.3	0 50	0 65	9.0
Milton -	,		j	1	1
Paspalum, some Ryc grass,	Spring	8 2	080	0 90	178
and White clover, growing on heavy black soil	Autumn		0 89	0 69	15.4
Bateman's Bay -				1	
Rat tail Feecues, Couch and	Spring	37	0 36	0 31	10.8
Parramatta grass, growing on dark brown loam	Autumn	37	0 30	015	63
Wandandian —				l	l
Wallaby grass, Meadow	Spring	26	0.20	017	6.5
Rice grass and Wire grass, on light brown sandy loam	Autumn	59	0 49	0 50	5.0
				<u> </u>	1

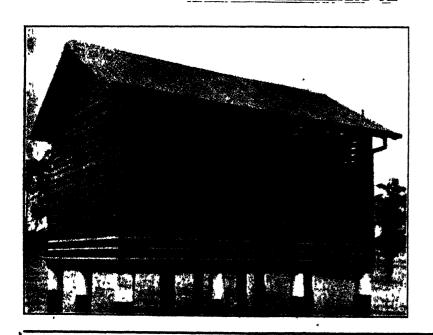
Data from M Henry and M S Benjamin N S W Department of Agriculture, Science Bulletin, No 64 Percentages on monsture free basis

#### Improvement Desirable.

These analyses showing the composition of some of our natural pastures indicate that the feeding value varies from one locality to another, and from one season to another in any given locality. At certain periods of the year, in many cases, the amounts of nutrients available from the pasture fall below the optimum requirements of the particular class of livestock carried. Such deficiency may, in some cases, lead to obvious nutritional disorders such as pica and osteomalacia, but it may also cause lowering of milk yield, retarded growth, reduction of lambing and calving percentages, and other effects which are not so obvious but which may lead to much economic loss. To avoid this loss, it is therefore desirable to make sure that an adequate level of nutrition is maintained.

Improvement of the general level of nutrition of animals on natural pasture may be effected by feeding supplements, by grazing on sown pasture, or by improving the quality of the native pasture itself. The lastmentioned two methods will be discussed in later sections of this article

(In he continued)



A Corn Crib
On Farm No 6 of the
Camden Park
Estate.

#### WAR GOSSIP IS DANGEROUS.

Enemy agents are vitally interested in Australia's war effort. Don't assist them by discussing what you know about the manufacture and storage of munitions.



#### TO OPERATORS OF GAS PRODUCERS, NOTE! THIS IS IMPORTANT.

Manufacturers, as well as the Major Oil Companies, are emphatic in their advice to operators of Producer Gas Units to beware of the folly of using ordinary engine oils in motors operating on Producer Gas. Filter systems are not yet perfect due to the human element as well as to the varying quality charcoal available. Vacuum Oil Company Pty. Ltd., marketers of Mebiloil and Piume Motor Spirit, also market

a range of High Quality lubricating oils specially designed for use in producer gas operated engines—Gargoyle Delvac Oils—S.A.E. 20 to 50. These oils contain a special "inhibitor," the function of which is to dissolve all gummy and resinous deposits carried over by the gas from defective fuel or from fuel made from unsuitable timber

The
Superior
Value
of
"Meggitt's"
has been

# PROVED BY RESULTS!

For many years Meggitt's Pure Linseed Steep Muts and Meggitt's Linseed Oil Meal have found first place in the rations of leading stock owners because of the uniformly satisfactory and economical results obtained from their use. They are rich in digestible protein and they contain 6% of Medicinal Linseed Oil, the laxative effect of which is supplemented by their content of vegetable mucilage.

In the feeding of sheep, Meggitt's Linseed Sheep Nuts combine to a degree possessed by no other feed, the qualities necessary in a supplement to dry fibrous pastures, etc. A relatively light ration of "Meggitt's" will keep the digestive system in good order, minimising losses from troubles such as impaction, and enabling sheep to make the maximum use of the natural feed.

For ewes with lamb at foot on dry feed about 4-ozs. of "Meggitt's" per day is adequate to reduce mortalities at lambing and make it possible for the ewe to produce sufficient milk to rear a healthy lamb. For dry sheep a lighter ration is usually sufficient to maintain the flock in stronger, healthier condition, and to produce a sounder and heavier fleece.

In the feeding of dairy cows, calves, pigs, beef stock, etc., Meggitt's Linseed Oil Meal is equally as valuable and gives equally as outstanding results. When preparing stock for Show or sale it is used by the majority of leading breeders as is shown by the fact that at the last 5 B.A.S. Shows (Sydney) over 98% of the prizewinning Beef and Dairy Stock were fed this product. All classes of stock owners throughout Australia feed "Meggitt's" to give them better and more profitable results, whether those results be in the form of increased milk yields or of a quicker grown, better finished carcass.

Stock owners requiring information on feeding, can obtain free literature and ration advice by writing to Meggitt Limited (address below).

#### AMPLE SUPPLIES.

Ample supplies of Meggitt's Pure Linseed Sheep Nats and Linseed Oil Meal are available through Produce Merchanis, General Stores, Stock and Station Agents, Butter Factories, or direct through Meggitt Limited.

# MEGGITTS PURE LINSEED OIL MEAL and PURE LINSEED SHEEP NUTS

Manufactured from Pure Linseed from which portion of the oil has been extracted by hydraulic pressure only.

MEGGITT LIMITED, HEAD OFFICE: 67 YORK STREET, SYDNEY. Works: PARRAMATTA-MELBOURNE-ADELAIDE. Box 1555 E, G.P.O., SYDNEY.

# Production of Pig Meats.

#### Type, Quality and Uniformity are Essential.

N. A. STEEL, H.D.A., Piggery Instructor.

THE production of pig meats is becoming an increasingly important industry. There is a heavy demand for prime pigs of all classes, but to ensure the production of animals which will comply with the market requirements, the pig farmer must aim at producing uniform pigs of good type and quality. Success in such an undertaking is closely associated with the management of the herd, and—in addition to breeding—feeding and housing play important parts; it is only by giving the closest attention to detail in these matters that maximum results will be obtained.

In the first place it must be clearly understood that the present market desires a smooth, evenly-developed pig of uniform depth, with a well proportioned length of side and full and fleshy hams. The underline must be straight, trim and neat. This type of pig must show that muscular tendency which denotes lean meat rather than fat.

Breeding is, of course, a primary consideration, for a pig will develop only towards its inherited possibilities. Careful consideration must therefore be given to the selection of each individual animal, especially the boar, for the brood herd. Breed alone is insufficient; it is the individual within the breed that is the important factor. Selection should therefore be made of pigs of the desired type and quality within strains of known breeding and with good production records.

Then, good management is essential Although every care may have been taken in the building up of the brood herd, much of the effort may be wasted through the adoption of faulty housing and feeding practices. Pigs respond very quickly to conditions and under the right conditions will grow rapidly, reaching market weights at early ages. Should the pigs be subjected to poor management in regard to either housing or feeding, their growth will be retarded and the quality of the resultant carcase impaired. This is evident in pigs which have been grown slowly, or held too long on the farm--until past their prime. In either case carcase quality is lost through the pigs having put on fat instead of flesh.

Uniformity can be attained only by limiting the number of breeds or crosses in the

herd, careful selection, and using a purebred boar of the desired type and quality. Regular grading of the pigs to size in the yards will also assist in maintaining quality and type, whilst regular culling of undesirable breeders should be practised.

Some interesting illustrations of the variation to be found in bacon carcases are shown in the accompanying plates. These carcases were appraised in accordance with Dr Hammond's system of carcase appraisal \* which relies on measurement rather than visual judgment.

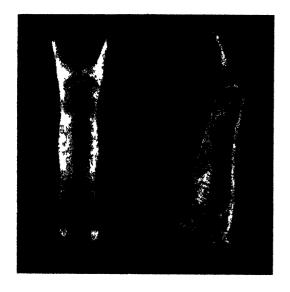
Fig 1.—Large White x Berkshire.—This is a typical well developed baconer, scoring well in all points with the exception of body length, which is definitely lacking. The carcase shows excellent eye muscle at loin (gaining full points), and the back fat measurement is very near to the ideal.

No. 2 Berkshire.—On appearance this is a very good baconer, but on appraisal of the carcase it does not score quite so well. The carcase shows better streak and body length measurement than the Large White x Berkshire pig, but the eye muscle at loin is lacking, whilst back fat thickness is too heavy. Had the diet of this pig been restricted for a short period before slaughter, possibly the development of fat would have been controlled and a lighter carcase produced. in which case more points would have been scored in relation to measurements.

<sup>\*</sup>See leaflet "Frozen Bacon Carcases—Quality Standards Defined," obtainable on application to the Department.







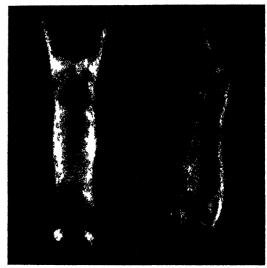




Fig. 1 -- Large White z Berkshire

Top -- 1 ive pig Crnws -- Carcase and side

Boltom -- Cross section at kan



Fig. 2.—Berkshire.

Tof.—Live pig Control—Carcase and side

Bottom —Cross-section at loin

No. 3.—Large White x Tamworth—This pig scores well for the shoulders, but no points for body length, whilst back fat thickness is excessive. With a carcase weight of 161 lb. it was indicated that the pig had been carried past its prime and should have been slaughtered at an earlier age. If this had been done the carcase weight would have been less, and probably body length and the proportion of back fat better.

The following tables give the individual points allotted —

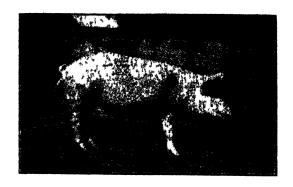
	,		
	No r	No 2	No 3
		1	` -
Breeding	large White	Berkshire	Large White
Age in days I ive weight	204 175 lb	197 175 lb	245 196 lb
Dressed weight	145 lb	146 lb	161 lb
	Carcase Ann	raical	

			140 10	101 10					
Carcase Appraisal.									
	Max Points	Points Allotted	Points Allotted	Points Allotted					
		1		`,					
(a) By Inspection Huns - Well filled and fine									
boned Shoulders- Light Streak Thick full of lean	7	7± 55	73 53	74					
mrat	12	84	10	10					
(b) By Measure-	Maxi mum Points	Actual Measure ment	Actual Measure ment	Actual Measure ment					
"I ve muscle cflom Thick	<b>.</b> 8	54 mm 28 (54 mm )*		45 mm 16 (55 mm)					
Back fat thick new correct proportion	-0	19 mm 191 (20 mm)*		30 mm 7 (22 mm)					
Lody length in proportion to weight	20	727 mm 23 (815 mm)*	7(7 mm 10} (915 mm )	735 mm (845 nim					
leg length-Short	5	540 mm 5 (564 mm)*	545 mm 5 (564 iam )	575 mm 5 (584 mm)					
IOTAL	100		671	54					

\*Ideal measurements in proportion to carcase weight shown in brackets

It will be noticed that lack of body length is a common fault, whilst in each case still points were scored for leg length, which measured well within the range allowed for the respective carcases. The condition of the pigs as indicated by the proportionate back fat measurements was variable, stressing the need for carefully finishing the pigs off\_before marketing.

The writer is indebted to the Principal Hurlstone Agricultural High School, Glenfield, for his co-operation and assistance in providing the animals of which illustrations are shown in this article.



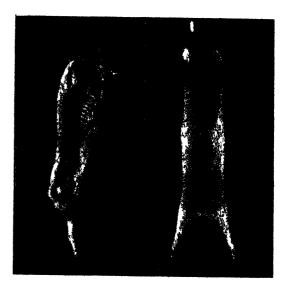




Fig. 3.—Large White x Tamworth

Top —Live pig Centre —Carcase and side.

Bottom.—Cross-section at ion

#### Tubercle-free Herds.

The following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
and the second s		1942.			1943
. I. Toohey, " Mandemar," Berrima	56	8 July.	A. E. Stace, Taylor Street, Armidale	31	7 Feb.
idcombe State Hospital and Home			New England University College, Armidale	13	r Mar.
			A. C. O'Dea, Perry Street, Dundas	28	19 .
		1 - 1 "	Trangie Experiment Farm, Trangie	138	19 ,,
Hannaford		14 ,,	Emu Plains Prison Farm	100	20 ,,
. T. Reid, "Narrangullen," Yass		15 ,,	Lunacy Department, Morisset Mental Hospital		
liss N. C. Brenan, Arrankamp, Bowral		15 ,,		114	25 2 Apri
arrer Memorial Agricultural High School,			Berry Training Farm, Berry		
Ne ningha	27	17 ,,		23	3 "
arm Home for Boys, Mittagong		18 ,,	Liverpool State Hospital and Home	102	10 ,,
t. Vincent's Boys' Home, Westmead		19 ,,	K. W. D. Humphries, "Karoola," Muswell-	'	
. I., Killen, "Pine Park," Mumbil	201	20 ,,	brook	162	24 ,,
. M. Edwards, Uralla	5	22 ,,	H. F. White, Bald Blair, Guyra (Aberdeen		_
I. N. Coote, Auburn Vale Road, Inverell	30	22 ,,	Angus)	137	26 ,,
I. East, Gum Flat Road, Inverell	41	22 ,,	St. Michael's Orphanage, Baulkham Hills	18	5 ,,
. D. Frater, Inverell		23 ,,	F. C. Harcombe, Hillcrest Farm, Warialda		
Brownlow Col Gol	94	26 ,,	Road, Inverell	32	15 ,,
Juristone Agricultur. I High School, Glenfield	33	26 ,,	A. N. De Fraine, Reserveir Hill, Inverell	22	15 ,,
lew England Experiment Farm, Glen Innes	33	20 ,,	Grafton Experiment Farm	190	17 ,,
	64	27	Sir F. H. Stewart, Dundas	6	30 ,,
(Jerseys) Mantal	1 04	-/	Cowra Experiment Farm	41	27 Jun
unacy Department, Rydalmere Mental		27	A. E. Liggins, "St. Leger Dairy," Kuring-gar	4.	2, 3
Hospital	48	-6	Chase Road, Turramurra North	52	7 July.
V. Boland, "Seaton," Inverell	14	28 ,,	Kahlua Pastoral Co., "Kahlua," Coolac		10 "
. M. Turnbull, "Pastime," Kayuga-road,			Ranna Pastorai Co., Ramoa, Coolac	314	10 ,,
Muswellbrook	i 82	5 Aug.	W. Budden, "Hunter View," Kayuga Road,		- A
eel River Land and Mineral Co., Tamworth			Muswellbrook	. 18	5 Aug.
(Beef Shorthorns)	16	8 ,,	The William Thompson Masonic School,		
. I. Fairbairn, Woomargama	210	26 Sept.	Baulkham Hills	50	20 ,,
and C. Ryall, 5 Western Avenue, West	i i		J. McKenzie, Inverell	35	28 ,,
Wollongong	57	7 Oct.	Navua Ltd., Grose Wold, via Richmond		
V. J. Stephenson, "Hill View," Fig Tree		10 ,,	(Jerseys)	113	₄ Sept
V. C. Wyatt, Sherwood Road, Merrylands	20	12 ,,	Australian Missionary College, Cooranbong	113	8 ,,
hsman Bros., Inverell	25	17 ,,	Department of Education, Gosford Farm	-	
lawkesbury Agricultural College, Richmond	1 -3	-, ,,	Home	40	29 ,,
(Ierseys)	128	18	A. L. Logue, "Thornbro," Muswellbrook		13 Oct.
egenhoe Estates, Scone	65	1 "	Barnardo Farm School, Mowbray Park		1 4 ,,
unacy Department, Gladesville Mental	V5	31 ,,	Wollongbar Experiment Farm		4 Dec.
Monital		14 Nov.	Wollongbar Experiment Farm State Penitentiary, Long Bay		9 ,,
Hospital Sathurst Experiment Farm (Ayrshires)	22	1 4	Composition and and in		1944.
Samurat Experiment Family (Ayramas)	21	18 ,,	Limond Bros., Morisset	60	13 Jan.
V. W. Martin, "Narooma," Urana Road		1	Department of Education, Yanco Agricultural		
Wagga	150	29 .,			6 Feb.
l. G. Wilson, Exeter (Jerseys)	68	29 ,,	High School		
	1	1	Riverina Welfare Parm, Yanco		6 ,,
IcGarvie Smith Animal Health Farm, Liver-		1943.	St. Ignatius College, Riverview		27
pool	65	r Feb.	C. Wilton, Bligh Street, Muswellbrook	75	3 Mar.
unacy Department, Parramatta Menta	1	ł	N. I., Forster, Abington, Armidale (Aberdeen		i
Hospital	. 31	5 ,,	Angus)	188	12 ,,
The Sydney Church of England Grammar		1	Forster and Sons, Abington Armidale (Jerseys)	87	13 ,
School, Moss Vale	1 44	6 ,,	Wagga Experiment Farm (Jerseys)		20 ,,
Pudor House Sch ol, Moss Vale	17	1 6 ,,	Lunacy Department, Callan Park Mental		1
Koyong School, Moss Vale	1 2		Hounital	26	r May
New England Girls' Grammar School, Armidale			T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 June
now isugiand this tradition of hoof, Armidale	25	0 ,,	1. J. Huns, Vans Luitu, Musmantibion	3/	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry.



# Brucellosis-free Herd Scheme (Swine). LIST OF ACCREDITED HERDS.

IME following is a list of the names and addresses of owners of herds which have been declared brucellosisfree in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in
connection with this scheme has been undertaken as part of the general campaign against this disease
and should perform a valuable service to the industry generally. Owing to the limitations of staff it will
not be possible for the Department to undertake the testing of herds in general for this purpose and in
future only herds belonging to Government institutions, registered stud herds, or those containing a
preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made
for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has
been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the
conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at
each test. So far as the elimination of the disease is concerned, apart from placing the herd on the
accredited list, this work will continue as at present.

#### Registered Stud Herds.

Registered

Adams, J. P., "Melton," Daysdale.

Allard, S. R., Cleobury Stud, Werombie Road, via Camden.

Bathurst Experiment Farm, Bathurst.

Campbell, D., Hillangrove, "Wamberal," via Gosford.

Chapman, G. E. and Son. "Illabo Park," Alectown.

Cocks, F. D., "Condalarra," Gooloogong.

Cowra Experiment Farm, Cowra.

Croft, F., Lugwardine, Kentucky.

Draper R. E., "Glengar," Capertee.

Bade, E. M., "Bade Vale," Euchareena.

Farrer Memorial Agricultural High School, Nemingha.

Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.

Grafton Experiment Farm, Grafton.

Grabam, R. M. Kinilabah Stud, Wagga.

Harris, K. H., Pennant Stud Piggery, Purchase Road, West

Pennant Hills.

Hawkesbury Agricultural College, Richmond.

tud Herds.

Holland, A. L., Argonne, Tubbul.

Hurlstone Agricultural High School, Glenfield.

Liverpool State Hospital and Home, Liverpool.

Mavbin, N. C., Towac, Orange.

McCaughey Memorial Agricultural High School, Yanco.

New England Experiment Farm, Glen Innes.

Newington State Hospital and Home, Newington.

Riverina Welfare Farm, Yanco.

Government Agricultural Training Farm, Scheyville.

Shirley, G. F., "Camelot," Penrith.

Smith, J. M., Eulo Glen, Urana.

Stewart, Sir Frederick, "St. Cloud" Dundas.

Wagga Experiment Farm, Bomen.

White, A. N., Blakeney Stud, Orange.

Williams, G. R. B., "Gwandalan," Grenfell.

Wilson, A. G., Blytheswood Exeter.

Wollongbar Experiment Farm Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Aflorestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla
Emu Plains Prison Farm, Emu Plains.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.

Morisset Mental Hospital, Morisset.

Morisset Mental Hospital, Morisset.
Oberon Prison Camp, Oberon.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V., Marata, Harrow Road, Glenfield.
Smith, C. W. J., "Norbiton" Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

#### Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certilying herds abortion-free:—

Owner and Address.	Number in herd.		Number in herd
Bathurst Experiment Farm (Ayrshires)  Bauerle, P. A., Holbrook  Bush, W., Ben Lomond  Carrick, G., "Cloniea," Central Tilba  Cowra Experiment Farm (Ayrshires)  Curtis, A., Meryla, Morven  Department of Education—Farm Home for Boys Gosford  Department of Education—Farm Home for Boys Mittagong  Dixson, R. C., "Elwatan," Castle Hill  Edwards, G. M., "Rothwick," Uralia (Jerseys)  Fairbridge Farm School, Molong  Farrer Memorial Agricultural High School, Nemingha. Forster and Sons, Abington, Armidale (Jerseys)  Forster and Sons, Abington, Armidale (Aberdeen-Angus)  Hawkesbury Agricultural College, Richmond (Jerseys)  Hill, E. Pritchard, Bowling Alley Pt. (Jerseys)  Hordern, E. D., Cabramatta (A.I.S.)  Hurlstone Agricultural High School Glenfield  Killen, E. L., "Pine Park," Mumbil  Leitch, J. F. "Tunbridge," Merriwa (Aberdeen-Angus McBachern, H., Tarcutta (Red Po!)  McSweeney, W. J., "The Rivers," Canowindra (Jerseys)	9 18 37 41 35 40 38 24 47 265 188 108 43 100 95 8 202 48 9	McSweeney, W. J., "The Rivers," Canowindra (Beef Shorthorns) Martin Bros., "Narcoma," Urana-road, Wagga Morisset Mental Hospital Navua Ltd., Grose Wold, via Richmond (Jerseys) New England Experiment Farm, Gien Innes (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., "(Beef Shorthorns) Tamworth. Reid, G. T., "Narrangullen," Yass Robertson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wwworne," Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud, Spurway- street, Dundas Trangie Experiment Farm, Trangie Wagga Experiment Farm, Bomen, N.S.W. Walker Jas. R., "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen Angus) Williams, Chas., Ben Lomond Young, A. H., 'Rock Lynn," Cudal (Polled Beef Shorthorns)	31 125 80 132 137 160 120 171 82 30 66 88 88 81 32

### Approved Seed.

July, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied regarding it to inquirers.

Cauliflower. Shorts-H. Burton Bradley, Sherwood Farm, Moorland.

Hawkesbury Solid White and Phenomenal Five Months-E. A. Sharp, 110 Gordon-avenue, Hamilton.

Tomatoes. Bonny Best - Manager, Experiment Farm,

Bathurst. (4s. oz. posted.) Marvana — Rumseys Seeds Pty Ltd., 331 Church-street, Parramatta. Break-o'-Day—Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta.

Australian Earliana-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta. Rouge de Marmande-Rumseys Seeds Pty. Ltd.,

331 Church-street, Parramatta. Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Beans Tweed Wonder—H. P. Richards, "Sovereignton," Tenterfield.

#### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recom-mended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:-

Potatoes -

Certified Seed Potatoes -Factor and Katahdin.

Cauliflowers-

Hawkesbury Solid White, Nugget, Shorts. Onions-

Hunter River Brown, Maitland White.

Tomatoes-Australian Earliana, Bonny Best, Improved Walker's Recruit, Red Marhio, Salad's Special

Pumpkins-Oueensland Blue.

Tweed Wonder, Brown Beauty.

Grasses, etc.-

Phalaris tuberosa, Subterranean Clover (midseason), Sheep's Burnet, Lucerne.

#### Fit Gas Producers to Farm Lorries, Etc.

THE Liquid Fuel Control Board has advised the Department of Agriculture that the petrol position is such that primary producers would be well advised to arrange without delay to purchase and fit gas producer units to such of their vehicles as are required for the carrying on of their essential activities

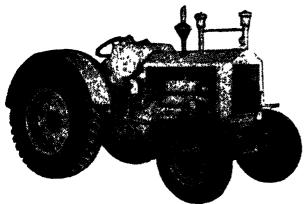
This advice applies particularly to growers participating in the Commonwealth Government's vegetable scheme, those orchardists who normally use large quantities of petrol during the peak of the season, wheat grovers, graziers who may require their lorries for the cartage of the wool clip, and apiarists whose petrol usage for the transport of hives is generally heavy.

The uncertainty with regard to future supplies of motor spirit is the reason prompting the Liquid Fuel Board's advice that essential users should, as a measure of self protection, and in the national

interests, adapt their vehicles for the use of substitute tuels. Producer gas has been especially mentioned, since supplies of charcoal are more readily procurable in all sections of the State than are the other known substitute fuels.

The Department of Agriculture, therefore, advises vegetable growers who are participating in the vegetable scheme, and all other primary producers whose seasonal requirements, over and above the petrol allowed under the rationing scale, may reach such proportions that petrol resources cannot fill requirements, to have their motor lorries fitted with producer gas units. The trend of events has shown that ultimately conversion to substitute fuels will be an inexorable necessity and growers should not wait until the last moment when gas producers may be difficult to obtain at short notice.

YOU CAN SAVE VALUABLE LIQUID FUEL by using a DIESEL TRACTOR which consumes almost half as much fuel as a Spark Ignition Tractor.



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Simplest,
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Cheapest running
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243/247 CLEVELAND ST., REDFERN, N.S.W., or enquire at your Local Agent.

## ASK YOUR STOREKEEPER

-FOR-

# "RFNOWN"

Brand :

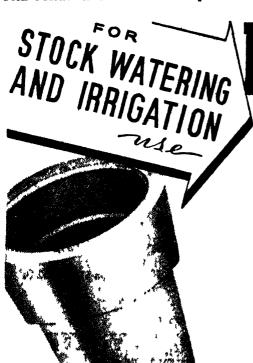
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Think over these important advantages offered you by "FIBROLITE" Asbestos Cement Pressure Pipes . . . .

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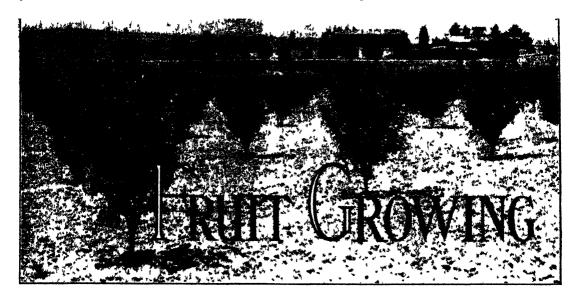
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#### THE PRUNING OF THE WILLIAMS PEAR.

D. T. KII PATRICK HD V. Fruit Instructor.

THIS popular variety has proved itself suitable for growing under a great range of geographic and climatic conditions, and is more widely planted than any other variety of pear in inland areas, on the tablelands and in the coastal districts.

The fruiting habit and tree type of this variety vary according to the prevailing geographic and climatic variations, and to a lesser extent according to such factors as the soil and rainfall within a district, so that it is evident that a pruning system suitable for one district may not be entirely satisfactory in another; generally, some form of modification from a standard method must be adopted and this may apply, even within a locality.

Thus, when the Williams pear is grown in this State under very favourable conditions as to altitude, soil and rainfall, such as prevail upon certain parts of the tablelands, it spurs readily and responds well to the practice of shortening laterals to a few inches in length. On the coast, however, it neither spurs readily nor furnishes well with fruit buds when the laterals are cut; in this area the variety does not ordinarily bud up satisfactorily, and the terminal and near terminal fruit buds on one year laterals are relied upon for the crop. For this reason, the crops on coastal trees are seldom heavy, although they are often better than indicated by the budding prospects

#### The Average Tableland Type.

No attempt will be made to cover the whole field of Williams pruning in these notes, but an outline will be given of the

pruning of this variety under average tableland conditions—the conditions under which much of the crop is grown and under which it spurs only satisfactorily to moderately well, and cut laterals have the tendency to run bare. In short, the type of Williams under consideration is that in which cropping must be induced upon true spurs and lateral built spurs, and also upon one year laterals, for optimum results, not only in respect to yield, regular cropping and size of fruit, but also in respect to longevity and vigour in the tree.

#### The Framework Desired.

The pear has a tendency to grow with a somewhat conical framework, and when pruned and headed without sufficient correction to this characteristic, it frequently results in a "narrow-gutted" type of tree. For the first few years the aim of the

pruner should be to encourage ample framework proportions and root growth, and then particular attention may be paid to the thinning out of the portions left with the object of encouraging greater spread. Recourse to the use of the saw in removing temporary limbs is deprecated; the removal of any part should be carried out while it



Six-year-old Williams Pear Not Corrected for Spread

may be accomplished with secateurs. The cropping of the tree will generally further improve its form.

A basic form of tree having approximately eight main limbs, each bearing an average of about three secondary limbs, the lowest set not lower than waist height, is suggested. The secondary limbs should be strong, but less stout than the main limbs themselves so that they may develop more obliquely and provide that extensive shading to the trunk and root area of the tree which is considered so highly important.

Every care should be taken of the vigorous lateral growths usually thrown out above the crotch and below the attachments of the lowest secondary limbs, particularly after these limbs have become permanently somewhat oblique. Appreciable quantities of clean, clear-skinned pears can be borne on vigorous, extensive, lateral-built spurs in this region, which is so frequently neglected and allowed to run bare by the unreasonable practice of excessively suppressing, or indeed completely removing,

strong healthy growths in that part of the young tree when they could earlier have been used for leaf production, and therefore stimulate frame and root growth, and later increase fruit production.

The opinion is frequently expressed that fruit is not required in that part of the tree—one reason given being that it may be bumped off by cultural implements. Though pruning methods are often designed to suit cultural operations, it would appear more logical to design cultural operations to suit pruning methods.

#### Pruning for Fruit Production.

In the detailed pruning of the Williams pear for fruit, due regard must be paid to the treatment of each kind of fruitbearing structure for best results.

When the variety is grown under average tableland conditions, the true spurs are not particularly robust and their deterioration is hastened by indiscriminate spur pruning. No opportunity to replace a worn-out spur with a new lateral should be lost.

#### Spur Pruning According to Vigour.

An examination of a fruiting spur will reveal which subsections are fruitful and which subsections continue to blossom each year or in alternate years, without setting fruit. A series of large plump bulbs



The Shade from a Spreading Tree is Considerable,

upon which fruit was carried along a subsection, indicates that it is of a fruitful character, while a series of small, pinched bulbs indicates that the subsection blossomed frequently, but either carried no fruit or small fruits only. These latter frequently have their origin in the basal buds of a lateral, in the side buds of a weak lateral and in dormant buds forced by cutting back a spur or by cutting through a bulb. In most cases, they are borne as the back subsections of aged spurs, and yet one often sees spurs mutilated by so-called spur pruning—the removal, usually by one cut, of all the fruitful subsections, leaving only those weak subsections which appear never to have fruited at any time—with the object of carrying the fruit close to the limbs. It seems inexplicable that fruitful subsections should be cut away for the purpose of fruiting nearer the tree, when it is considered that the spur is virtually ruined in the process, and that robust fruitful subsections in good condition are sacrificed for weak unfruitful subsections which may or may not make up at some future date.

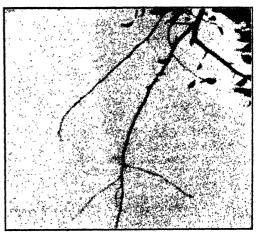
Spur pruning of the Williams pear includes the thinning out of fruit buds where they are excessive, the cutting out of all unfruitful subsections including aged wood spur subsections, and the complete removal of all weak spurs of this type. The rule, "spur prune according to the history of the subsection and not according to its distance from the tree," is suggested as a general guide.



Unpruned Lateral which has Cropped and Refurnished with Fruit Buds,

#### Results of Lateral Pruning Variable.

The response of this variety to lateral pruning is variable. Strong laterals when cut, bud up fairly readily. Laterals of medium vigour are not so easily handled—they may fail to furnish in their second



Lateral which Cropped on Single Terminal Bud and Did Not Refurnish

year—but in their third year often throw fruit buds. An average length of 4 or 5 inches seems most desirable. Weak laterals up to 6 inches or more in length should never be shortened. If pruned, they seldom serve a very useful purpose, but if allowed to go untopped the vigorous terminal bud often grows a strong lateral which can be handled to become productive and which, in growing, assists materially in strengthning the spur, while the weak lateral itself frequently develops fruit buds.

Non-fruitful subsections should be kept off, if only for the reason that they are frequently the cause of blemish to the fruit. The opinion is ventured that the fairly general practice of dispensing with the most robust and vigorous portions of weak laterals and spurs is the cause of extreme variations in fruit size upon a tree. In other words, variation in fruit size is the result of the artificial selection forcing into fruitfulness, weak buds which, under conditions of natural selection, would have perished or have been suppressed.

#### Use of Yearling Fruiting Laterals.

Although they are commonly neglected for fruit production, the strong one-yearold laterals bearing fruit buds are of im-

portance.

Ordinarily, weak laterals up to 8 inches and terminated by a fruit bud are left unpruned, and produce good pears, at the same time reproducing buds or laterals from the terminal bulb. As in the case of all weak laterals, buds other than the terminal bud are inherently weak in this variety, and generally develop unsatisfactorily when the lateral is cut.

The Williams pear does not furnish the medium to strong yearling lateral with fruit buds quite so well as the Packham's Triumph and certain other varieties of pears, nor does it furnish so well with fruit buds in the second year, when the lateral is left full length. Nevertheless, whenever the trees are reasonably vigorous no pruning system for Williams is complete which does not embrace the employment of fruit buds on yearling wood for fruit production. The buds are borne towards the terminal in most cases, and the laterals are left unshortened unless too numerous. In this case, a thinning out of the laterals is recommended to, say, 2 feet apart, those thinned out being treated as for lateral pruning.

Yearling laterals generally set their fruit in clusters and it grows large, the laterals thickening and strengthening considerably

while the fruit is being carried.

The form of tree described readily lends itself to the adoption of this system, particularly if horizontally placed laterals are selected in preference to those growing in a vertical direction. Selected laterals will not break even when carrying a heavy weight of pears, and a careful selection of laterals will not interfere with the normal development of leaders and lateral built

spurs. Careful examination of the fruit borne on such laterals has shown that it is freer of limb rub blemish than the fruit on the other parts of the tree. Consider how long in this variety it would take a lateral built spur to develop six or eight fruit buds; and yet this number of buds is often pruned off because they are not as near the limb as one has been accustomed to require them.

In the second year, the terminal extension may be shortened back hard to a few buds only in length, and again the original lateral cropped, if it has refurnished. Only if it carries an excessive number of buds does it require to be shortened, but what constitutes an excessive number will depend entirely upon conditions in the individual tree.

A reasonably strong lateral having a terminal fruit end only, is likely to run bare while fruiting at the end, and a single bud is better rubbed off if it is desired to leave such a lateral for budding up.

#### Quick Cropping of Re-worked Trees.

Re-worked trees are particularly responsive to this system of cropping, and the root system of the stock variety is capable of sustaining as heavy a crop as can be induced upon the grafts. Vigorous horizontal and drooping laterals usually found upon strong growing grafts are ideal for the purpose; while yielding well at eighteen months and heavily at two and a half years from working they appear rather to strengthen and develop the framework than weaken it.

The unpruned lateral system deserves wider adoption than it has received, and consideration at least might profitably be given to its advantages.

#### Selection and Care of Scions For Re-working Deciduous Trees.

J. A. BALLANTYNE, Special Fruit Instructor.

GROWERS who intend re-working deciduous trees this season are reminded that consideration should be given now to obtaining grafting wood. It frequently happens that the grower, in his anxiety to get on with the pruning, postpones the collection of grafting wood and then finds that the suitable trees from which it was intended to get his scions have been pruned, and his "selected" trees are gone.

The necessity for the selection of grafting wood and for obtaining it from healthy trees of a desired type, is known and apparent to all. In the case of some fruits, such

as cherries for instance, if care is not taken in this regard the result may well prove disastrous to the grower.

Twigs that have made growths of from 1 to 2 feet the preceding season are usually ideal for scion wood. The wood should be mature, and any immature tip portions removed.

It is essential that the scion wood be kept dormant and that it be kept cool and moist until time for using. The wood can, of course, be wrapped in bags and placed in cool stores, but the usual method is to tie the scion wood up in convenient sized bundles and bury the material in the soil, covering to a depth of about 1 foot with soil. It is advisable to pick the position and to bury the wood in as cool a place as possible—under trees, water tank, etc.

Although the grafting wood must be kept moist, it must not be allowed to become or remain too wet, otherwise rotting of the wood, and early bud movement of the buds on the sticks, may result. It is a good idea to place a few bags on top of the soil covering in order to avoid over-wetting during wet weather, and this will also assist in keeping the immediate soil temperature down to a minimum during the heat of the day. One further point—mark the position of the scion wood. This can be done by the use of stakes in the ground, or various other methods which may appeal to the grower. If it is not done, damage to the grafting wood may result when the time arrives for excavation of the scions.

Growers of apples and pears will be interested to learn that the main feature of fruit growing notes in next issue will be an article on the re-working of those fruits.

#### The Packham's Triumph Pear.

J. V. McGRATH, Fruit Instructor.

FRUITGROWERS of Australia are deeply indebted to the late Mr. Charles Henry Packham, of Molong, for the raising of what is probably the most popular commercial pear in this country to-day—the Packham's Triumph.

Charles Henry Packham, who died in 1909 at the age of sixty-seven years, was born in the Parramatta district, his father being one of the pioneer settlers. Mr. Packham was always associated with primary production, and purchased "Clifton," in the Molong district, where he conducted general farming operations. He took a keen interest in the small orchard on the property, and eventually started cross fertilisation work with pears in an effort to raise new varieties that might be of commercial value. It was in 1896 that the greatest success came to his work in this direction, following the crossing of the Uvedale St. Germain (sometimes called the Bell) pear



The Late Mr. Charles Packham.
The trees shown are some of the original Packham's Triumphs.



Cluster of Packham's Triumph Pears from one of the First Trees Propagated by the late Mr. Charles Packham.

with Williams. A seedling from this cross produced fruit of an outstanding quality, and the variety was named Packham's Triumph.

From the first crop of Triumphs, samples

From the first crop of Triumphs, samples were sent to the Fruit Expert (Mr. W. J. Allen) of the Department of Agriculture, who reported very favourably upon the variety. Mr. Packham received many requests for trees of the new variety from growers in New South Wales, Victoria and Tasmania.

His enthusiasm for improvement work did not abate, and shortly afterwards Packham's Late was produced and named. This, however, did not catch the public tancy to the same extent as the Triumph Still another variety evolved by Mr. Packham at a later date was named Packham's Autumn Nelis, but it did not go on to the mar-

ket, Mr. Packham continued to raise seedling pears from various crosses, and at the time of his death there were about 20,000 seedlings growing on his property at Molong.

The original Packham's Triumph tree, together with any seedlings that remained on the property, was destroyed about twenty-two years ago, and with the exception of two fig trees and an almond tree, the original orchard has now disappeared.

"Clifton" is still in the hands of the Packham family, and is now being run by a grandson of Charles Packham. The present orchard on the property was planted by Mr. Packham's son.

The writer is indebted to Mr. S. W. Packham, of Molong, son of the late Charles Packham, for much of the information given.

#### Selected Citrus Buds.

#### The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1941 budding season, trees from which should be available for planting during the 1942 season --

	Washing- ton Navel.	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lislion Lemon.	Limperor Mandarin	lotal
Adamson, T	4,000	4,000		2,000	•••		10,000
Cambourn, H	2.500	5,000		3,000		•••	11,500
Catt, F D	2 000	3,000		3,000	1,000	•••	10,000
Eyles, A. T	5 000	5,000	1,000	2,000		•••	13,000
Ferguson, E. H	1,000	1,500		500	•••		3,000
Ferguson, F, & Son	2,500	2,500		•••			5,000
McKee, Geo	1,500	1,000		1,000	1,000	;	4,500
Rosen, L P, & Son	10,000	15 000	2,000	5,000	1,000	800	კვ,8იი
Smith, W			!	2,000		1	2,000
Spurway, F E, & Son	3,500	5,000	750	500	250	<b></b> ,	10,000
Swane Bros	5,000	2,000	1,000	1,000	1,000	800	10,800
	39,000	44,000	4,750	20,000	4,250	1,600	113,600

#### **GUARD YOUR TONGUE.**

You may pass on a minor piece of information that is harmless in itself, but linked with other pieces it forms a dangerous chain of rumour.

# 178ECT PESTS. Notes contributed by the Entomological branch.

#### THE POTATO MOTH.

(Phthorimæa operculella).

THE potato moth usually causes considerable loss in coastal potato crops in the months of October to December—particularly in the Tweed-Richmond-Clarence River areas. In these districts the warm, dry weather usually experienced in the growing period of the spring crop, i.e., from July to October, is very favourable to the development of potato moth, and the foliage becomes heavily infested. Later, when the tubers swell and the tops die off, the caterpillars fall off and make their way down cracks in the soil to the tubers. A close inspection at the time of dying-off of the tops, or when the tops are disturbed at digging, reveals hundreds of caterpillars crawling about on the soil in search of food. Any cracking of the soil will enable these to get at many of the tubers. Adult moths, too, may crawl down cracks and lay their eggs on exposed tubers.

#### Have the Soil in Good Physical Condition.

Growers should endeavour to have their soil in as good physical condition as possible, to prevent it from cracking. Sufficient cultivation of heavy soils to keep down weeds and preserve a granular tilth in the surface few inches, minimises the loss of water from the exposed surfaces along deep cracks in the soil.

#### Plant Deeply.

Growers in those areas which normally suffer severely from moth by reason of dry weather or the tendency of the soil to dry out and crack, should plant as deeply as possible—7 inches if the depth of the soil permits it. There is no doubt of the great

value of deep planting in protecting tubers. Tests carried out by the Department during the past season showed deep planting to be the biggest single factor in reducing infestation. In plots planted 8½ inches deep, infestation of the tubers was reduced from 66.4 per cent. to 36.7 per cent.

There was no indication that deep-planting reduced the yield; rather was there a slight increase in yield in the deep-planted plots. Deep planting may cause a slight delay in maturity, due to the shoots taking longer to appear above ground, but this can be compensated for by earlier planting. By this means deep planted material will be showing shoots above ground as soon as shallower planted sets. Deeper planting

means deeper tubers, which are less likely to crack the surface when swelling and are too far down for the moths and larvæ to reach

Growers in the coastal areas, who contemplate deep planting of their tubers, should take care to ensure that only well-sprouted seed is planted.

#### Hilling is of Great Value.

Experiments have shown that hilling, when properly carried out, is of great value in reducing infestation of the tubers.

The aim, in recent hilling experiments, was to draw the soil well round the plants as well as to throw a large wide mound of soil up against the plants. For this purpose a hiller was used and the work then finished by drawing the soil well round the base of the plants with a hoe or a stout curved, pronged rake. The hiller consisted of two long plates attached to a horse-hoe frame. The plates were slightly twisted so as to throw the soil over, after the manner of a mouldboard. The hilling produced by this means gave much better results than that obtained with a hiller alone, a mouldboard plough alone, or a scuffler alone.

Except where the area is small, growers cannot finish off the hilling in the above manner. The alternative, however, is to use hilling plates with a slight twist, so that the soil will be turned over and thrown well round the base of the plants. The importance of drawing the soil round the base of the plants is very great; when the tubers are swelling, cracks form round the base of the stalks, but if a quantity of loose soil is thrown round the base at the right time, cracks are less likely to form or, having formed, are filled in.

The single horse-hoe or scuffler does not give a good hill, but it gives a measure of protection.

The time of hilling is of great importance, the best time being when the rhizomes or laterals bearing the tubers have formed and the tubers are about half an inch in diameter. The time to hill will vary with the season; hilling will be done earlier in a good growing season than in a drier one. Hilling caused no reduction in yield in the departmental trials, but where the soil conditions are very dry, it may do so. Under very dry soil conditions it may be unwise to hill on account of a possible further drying out of the soil.

#### Width of Spacing of the Rows.

Potatoes are usually spaced with the rows 2 feet 4 inches or 2 feet 6 inches apart (28 rows to the chain).

It is considered that a wider spacing (2 feet 9 inches to 3 feet; 22 to 24 rows per chain) would give better results where hilling is to be carried out. Not only is there a larger amount of soil available (resulting in a better hill) but the width between the rows allows a late hilling to be done without risk of damage to the plants. In rows of 2 feet 4 inches, where the top growth is heavy, hilling may have to be done earlier than the best period to enable the implement to get between the plants.

In experiments, to test close spacing (2 feet 4 inches) as against a wide spacing (3 feet), the wide spacing gave a higher degree of control of moth at all times of hilling, and at both 5 inch and 9 inch planting depths. It also gave just as high a yield as the close spacing considered as tons per acre

#### Bag Promptly After Digging.

Leaving the tubers on the ground for any length of time after digging often leads to heavy losses. In coastal areas, early potatoes are dug when the tops are still green, and hundreds of larvæ may then be seen crawling about on the soil, and these may infest tubers left on the soil in a matter of minutes.

It was found on the Clarence, last December, that tubers bagged immediately showed a much lower degree of infestation, compared with tubers left exposed for an hour before bagging. While few growers would leave their tubers for an hour before bagging, it should be remembered that the greater the exposure the greater the likelihood of infestation.

On the coast where temperatures are high and potato moth is abundant, bags should not be left overnight in the field without sewing them up or covering them with clean bags. The covering of the bags with leaves and stalks is a very unsound practice, particularly if the bags are not sewn up.

#### Storage.

If tubers are to be stored on the property for seed purposes or prior to selling, they should be placed in a position as inaccessible to moths as possible. The ideal storage place is a bin or tank which can be made moth-proof. Where bins or tanks are not available the tubers should be stored in bags in a room or shed made as moth-proof

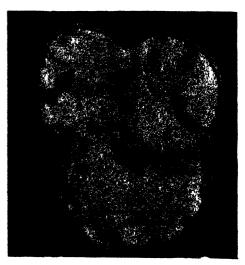
as possible until selling time.

Should the tubers become infested in storage they may be dusted with derris powder and kaolin mixed at the rate of derris powder I lb., kaolin 4 lb., or with a proprietary derris and kaolin mixture. The method of treating is to blow a few blasts of dust into the empty bag with a dust gun, then as bagging proceeds, blow or sprinkle in the dust so as to get a good coating over the tubers. The potatoes may also be treated in tubs by dipping them into the dust. Dusting will prevent the spread of infestation to clean tubers.

If an air-tight container is available, infested tubers may be fumigated with carbon bisulphide 2 lb. (24 fluid ounces) to 1,000 cubic feet of air space within the container for a period of forty-eight hours. Another fumigation ten to fourteen days later will be necessary to kill larvæ and moths which will have emerged from the eggs or pupal stage. Warning: No light of any description (pipes, cigarettes, fires or embers, radiators, stoves, etc.) must be allowed in or near sheds or buildings during the process of fumigation with carbon bisulphide. precaution should also be taken of cutting off the electric current. Even hot steam pipes have been known to cause explosion of this gas, and the steam should be cut off and the pipes allowed to cool before procceding with fumigation.

#### Control in the Leaves.

At times the potato moth damages the foliage of the plants so severely that numbers of the plants are killed outright. For growers with facilities for applying insecticides, dusting with a derris-kaolin dust (1:4) or spraying with derris 3 lb. to 100 gallons of water, is recommended, and if applied every ten days these treatments will greatly reduce moth infestation.



Potato Cut to Show Damage Done by Potato Moth Caterpillars.

A dust consisting of lead arsenate powder 3 lb., mixed with kaolin 1 lb., may also be applied to the leaves.

#### CUTWORMS.

(Noctuida:.)

GROWERS are warned that owing to seasonal conditions being favourable for the development of weeds, it is likely that several species of cutworms may become plentiful and may cause considerable damage to young, newly-planted vegetable crops, such as cabbage, cauliflower, lettuce, etc.

Cutworms are the larvæ or caterpillars of several species of greyish-brown or black moths which lay their eggs on grasses and weeds. They are stout-bodied caterpillars, black, slaty-brown or greenish in colour, which curl up characteristically into a spiral when disturbed.

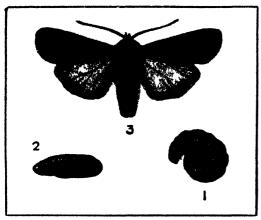
Cutworms remain hidden just beneath the surface of the soil or under clods during the day. They come out to feed at night, and young plants may be attacked as soon as they appear through the soil and their stems may be cut through at ground level. It is because of this habit of cutting through the stems of the plants that the popular name of "cutworm" has been applied to these caterpillars.

When fully-fed the cutworms, which may measure 1¼ inches in length, make their way down several inches into the soil and change into their pupal or chrysalis stage. They later emerge as adult moths, which may be seen flying about lights at night. Under warm conditions the life-cycle from egg to adult is about six weeks.

#### Control.

The following poison bran bait is very effective in controlling these pests:

Instead of Paris green, white arsenic or arsenite of soda (9 oz.) may be substituted,



1.-Larva (or Cu.worm). 2.-Pupa. 3.-Adult.

but the bait is then much less attractive and effective.

To prepare the bait, the bran and Paris green (or white arsenic) should be thoroughly mixed while dry and then made into a damp, crumbly mash with the water in which the salt has been dissolved. If arsenite of soda is used it should be dissolved in the water before mixing with the bran. Some finely-chopped lemons added to the water when mixing makes the bait more attractive.

The mash can be spread lightly along the rows of infested plants or broadcast through the crop. Ground that has been cleared should be baited several days before the crop is planted, as eggs laid on grasses and weeds may have already hatched and the cutworms may be present in the soil when the area is being prepared for cropping. The bait should be broadcast over the area, preferably late in the afternoon, at the rate of 50 lb. of prepared bait to the acre.

It must be remembered that the bait is poisonous and should be kept out of the reach of stock, and care should be taken in handling it.

#### THE BEAN WEEVIL.

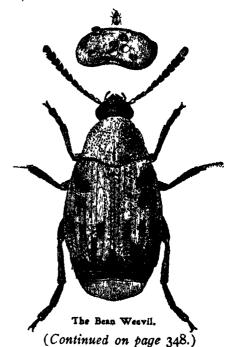
(Bruchus obtectus).

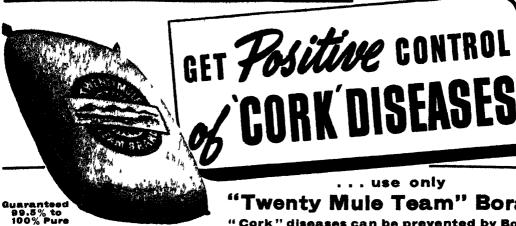
BOTH the larvæ and adults of this weevil attack bean seeds in the field or in storage.

#### Control.

Infested beans should be furnigated with carbon bisulphide in an airtight tank or other container, using the furnigant at the rate of 1 fluid ounce to 16 cubic feet of air space (5 lb. to 1,000 cubic feet). The carbon bisulphide may be poured over the seed or placed in a saucer on the top.

The seed should be fumigated for twenty-four hours, and then spread out on an insect-free surface to dispel the fumes. Do not fumigate for longer than the twenty-four hours as the germination of the seed may be affected. Care should be taken to ensure that the container used is air-tight, as faulty fumigation may not kill all the weevils and reinfestation from these will occur later. The fumes of carbon bisulphide are highly inflammable and consequently no light or fires of any kind should be allowed near where the fumigation is being carried out. (See warning on page 329.)





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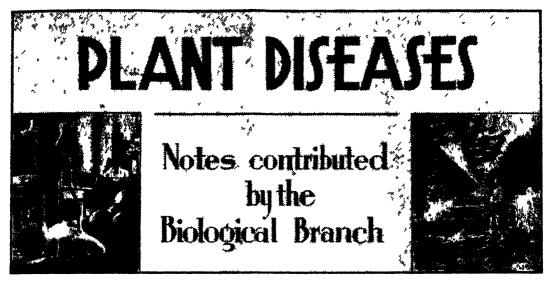


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#### DOWNY MILDEW OF ONIONS.

DOWNY MILDEW, caused by the fungus Peronospora destructor, is a disease which occurs every spring in coastal onion crops, being frequently responsible for considerable reductions in yields. In wet seasons the disease is also of importance in the inland onion-growing areas of this State. The losses caused by the disease result from leaf infection and subsequent reduction in size of the bulbs.

#### Symptoms.

THE first signs of the disease appear as a furry covering on the surface of the leaves. This covering is at first white, but later has a somewhat violet tinge. Affected areas of the leaves become pale green and finally yellowish. The diseased patches gradually enlarge until they merge, resulting in the whole leaf becoming yellow.

The furry growth on affected leaves consists of fungous threads and spores. These spores are carried to other parts of the crop and to neighbouring crops in the same district, and under moist weather conditions, result in the rapid spread and development of the disease

Following the downy mildew attack another disease usually makes its appearance. This is known as leaf mould, and is caused by the fungus Macrosporium parasiticum. It appears to be unable to gain entrance into onion leaves unless they are weakened by some other agency. The leaf mould disease, which causes a blackening of affected areas, is often responsible for much foliage injury, but, as downy mildew attack is necessary to pave the way for leaf mould, the

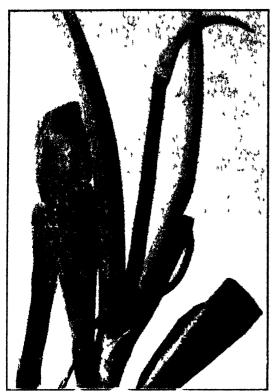
nuldew may be held responsible for the combined damage caused by the two diseases

#### Sources of Infection.

Once infection has taken place the downy mildew fungus spreads throughout the plant tissues and is present in the bulbs after the leaves have died away. It also spreads to the flower, and seeds from diseased plants may carry infection within the seed coat, or as an external contamination.

There are therefore, four sources of infection for a voung crop diseased leaves left in the field from the previous crop carry resting spores capable of infecting the new crop; diseased bulbs used for seed production will produce an abundance of spores on their first formed leaves, and seed may be diseased or contaminated

The development and spread of the discase are favoured by periods of wet, cool weather, and usually the disease develops more quickly and does more damage in damp situations where there is poor an or soil drainage. Even though plants become



Downy Mildew of Onion
Note the furry outgrowths on the leaves

affected during a period of wet weather, an ensuing spell of dry weather may enable them to outgrow the disease

#### Control Measures.

Complete control of omon mildew is difficult to attain, but the following measures assist in keeping the disease in check—

- r. Crop Sanitation and Rotation.—As far as practicable all dead tops, discarded bulbs etc. should be raked up and burned after the onions are harvested. A rotation of crops should be practised and onions should be grown on the same land only once in three or four years. Bulbs for seed production should, if possible, be selected from healthy plants and, if an onion grower finds it necessary to grow onions for seed as well as for bulbs, the seed plot should be separated as far as possible from the bulb crop
- 2. Air and Soil Drainage As moist conditions favour onton mildew the selection of fields where both air and soil drainage are good, helps to reduce the rapidity with which the disease develops and spreads.

- 3. Cultural Practices.—The adoption of cultural practices to keep the crop in as vigorous a condition as possible assists the plant to outgrow the disease when the latter is checked by dry weather.
- 4. Seed Treatment.—If it is suspected that the seed may have been produced by an infected crop it should be steeped in water heated to 122 deg. Fahr. (50 deg. C.) for 25 minutes. The seed should be tied loosely, ¼ lb. at a time, in cheesecloth, and suspended in a large volume of water (a kerosene-tinful) previously heated to the required temperature. The temperature may be maintained by means of a small flame or by insulating the tin in a box of straw.

Spraying for control of downy mildew is usually unsatisfactory. In the first place it is difficult to obtain good coverage because of the waxy nature of the leaf surface, and in the second place once the plants become infected, new crops of spotes are produced on all new leaves from the systemic mycelium in the infected plants.



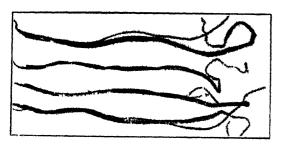
Spores of the Downy Mildew Fungus on the First Leaf of a Buib Infected in the Previous Sesson.

[After Murphy and McKay.

#### Onion Smut.

In countries where it occurs, smut, caused by the fungus Urocystis cepulae, is rated as the most important fungous disease of onions. It attacks the seedlings from the time of germination to an age of about three weeks. Most of the seedlings are killed, and those which survive and continue to develop until harvest time, produce bulbs of reduced size which are more subject to storage rots than are healthy bulbs.

The disease makes its appearance as black to brown, elongated blisters within the scales or leaves. These blisters contain the spores of the fungus. When once introduced into a soil the fungus remains infective for many years, as crop rotation for the elimination of the disease is not effective. Cool conditions are necessary for infection to take place, and at temperatures above 80 deg. Fahr. the parasite is incapable of growth.



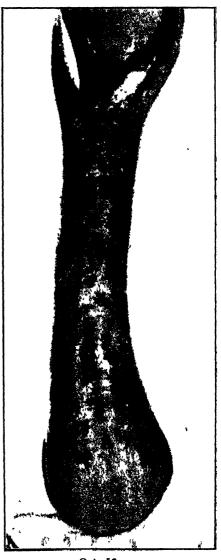
Smut Blisters on Seedling Onions.

[After Walker and Jones.

Smut has not yet become established in New South Wales, and it is important that every precaution should be taken to prevent it doing so. It occurs in some New Zealand onion-growing areas and its presence has been detected on onions imported from New Zealand to this country. These importations must be made during wartime, and it is almost inevitable that some infected bulbs will be introduced; and apparently clean, healthy bulbs may carry spores picked up by contact with diseased material in transit or in the field.

It is thought that the disease was introduced into New Zealand with onions imported for culinary purposes, some of which were used for seed production. It is most desirable that a similar occurrence should be avoided here. On no account should the imported bulbs be planted for seed production.

It is requested that any suspicious disease outbreak should be reported immediately to the Acting Chief Biologist, Department of Agriculture, Sydney.



Onion" Smut

Not yet recorded in New South Wales.

[After Walker.

#### Control of Damping-off.

#### Seedling Treatment.

"Damping-off" is a trouble which is likely to attack many varieties of young seed-lings. The onset of the disease is usually rather sudden. Seedlings which appear flourishing, may be found next day to have toppled over, and an examination reveals that the stems at ground level are in a soft, withered condition. Once it appears the disease will spread very rapidly and severe losses are likely.

The cause of "damping-off" is sometimes thought to be excess moisture, hence the name, but though wet conditions favour its development, they are not the actual cause. "Damping-off" results from the attack by soil-inhabiting fungi on seedling tissue at or about ground level. Fungi most commonly associated with "damping-off" are species of *Pythium* and *Rhizoctonia*. Only young, tender seedlings are susceptible.

#### Control.

The most satisfactory method of preventing "damping-off" is to use sterilised soil. Complete sterilisation is necessary, and care must be taken to prevent recontamination, as the disease is very much more severe in contaminated sterilised soils than in unsterilised soil.

As a precautionary measure, if unsterilised soil is used, the seed may be treated with a fungicidal dust (see Plant Disease

Notes in last issue), which will give some degree of protection against soil inhabiting fungi, or, alternatively, the seedlings may be sprayed at weekly intervals from the time of emergence until they are ready for transplanting. If no protective measures are taken and the disease appears, the seedlings should be sprayed at once. Three applications at intervals of four to five days should check the spread of the disease.



Cucumber Seedlings Showing Effect of Damping-off.

[After Leach.

The spray should thoroughly drench the seedlings and run down the stem to the soil. The sprays suggested are: (1) Bordeaux mixture (3 oz. bluestone, 1½ oz. quicklime, 5 gallons water), or (2) copper oxychloride at the rate of 1 oz. to 3 gallons of water.

#### TOPICAL ITEMS IN BRIEF.

#### Potato Seed Treatment.

Two important diseases of potatoes (Rhizoctonia and Scab) can be controlled by dipping the seed before planting in acidulated corrosive sublimate (mercuric chloride).

To prepare 25 gallons of dipping solution, 4 oz. of corrosive sublimate are dissolved by stirring in 2 pints of commercial hydrochloric (muriatic) acid in a glass or glazed earthenware vessel. This stock solution is then diluted with water in a wooden barrel or vat so that the final volume is 25 gallons. Cement or metal containers should not be used. Time of treatment is 10 minutes. The dipping solution should be dis-

carded after fifteen dippings or the time of treatment then extended 2 minutes for each additional dipping.

After treatment the seed should be planted immediately or dried thoroughly and stored in a dry place.

Further details of these diseases can be had on application to the Acting Chief Biologist, Department of Agriculture.

#### Vegetable Seed Treatment.

Spring sowings of peas, especially in soils which are rather wet, may suffer from preemergence rots unless the seed is protected

(Continued on page 347.)

# Bee-keeping Hints

#### Nuclei Colonies for Beginners.

O

W. A. GOODACRE, Senior Apiary Instructor.

THE majority of beginners in bee-keeping commence their practical work by securing a nucleus colony or two during spring, and a few points concerning these small colonies should be of interest. The standard-sized nucleus hive, generally supplied by special bee-breeders, contains three full depth frames with drawn combs, and sufficient bees, brood, and stores to provide a foundation for increasing strength. A queen bee must, of course, accompany the colony, and an untested queen, which is less expensive than a tested one, will serve the purpose very well.

The site selected for the hive and any likely extensions in the apiary should be well planned a sunny position in a quiet corner of the yard being preferable. suitable hive-stand may be made from four half bricks set firmly and level on the ground, supporting each corner of the hive. The stand is not so much for the nucleus but for the full-sized hive to which the small colony must be transferred soon after receiving it. Many beginners err in setting up a high stand which, when the hive is built up with supers, causes a deal of inconvenience in manipulation. It must be remembered, too, that it is necessary, at times, to shake or brush bees from combs, and it is easier for them to re-enter the hive when it is close to the ground; this applies to young bees particularly, as they may not have gained their wings.

#### Material and Working Equipment Required.

To accommodate a nucleus colony and provide for manipulation and control of the bees, the undermentioned hive-material and working-equipment should be procured.



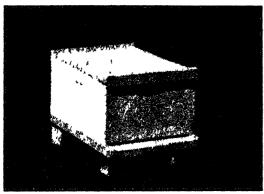
Inspecting a Nucleus Hive.

HIVE MATERIAL.	pproximate Cost
	s. d.
1 Single storey 8-frame hive with	
frames	15 0
1/2 lb. reel Frame wire (30 gauge)	1 1
I lb. Comb-foundation (medium	
brood)	3 0
1 lb. Nails $(2^{1}/_{2} \times 12)$	0 7
1 lb. Nails (1 × 18)	0 10
Total	21 0
WORKING EQUIPMENT.	s. d.
1 Bee veil (black net)	29
1 Hive tool	2 3
1 Bee smoker (2½ in. barrel)	6 0
Total	11 0

It is not proposed to go into the matter of preparing this material and the general management and control of the bees, as these subjects are dealt with in detail in the department's book "Bees and Honey,"

which every beginner should have on hand, and which may be obtained from the Department, price 2s. 9d., post paid.

After transferring the combs and bees from the nucleus hive to the full-sized one as described in the above publication, it is advisable to assist the small colony to make the most of its desire for extension



A Hive on a Brick Stand.

work. This is best effected by supplying small quantities of stimulative food every couple of days for a week or so. Sugar syrup, made of sugar and water, equal parts by volume, stirred well and fed lukewarm to the bees inside the hive, is recommended. An ordinary cupful is sufficient for each feeding, and for an improvised feeding-vessel, a small tin, with a dozen small slats or sticks, slightly longer than the feeder, standing in it, so as to prevent the bees being drowned, will serve the purpose quite well. As it is not necessary to have the full complement of frames in the hive at this stage, there will be ample room for the feeder, and the best place for it is toward the rear of the hive alongside the outside frame, where the bees will find easy access to the syrup food.

It is sufficient to make an inspection of the colony alout once a week, and thus observe any progress made and if necessary provide for any extensions.

#### The Importance of Early Brood-rearing.

THE importance of enabling colonies of bees to become progressive in brood-rearing early in the spring cannot be over estimated, particularly following adverse autumn and winter conditions as experienced over most of the State this year. In warm districts the season is fully a month earlier than in cooler areas, principally of the Tablelands Division, and the movement of bees to selected sites in the warm country to secure the advantage of early brood-rearing activity should be considered by all bee-farmers who have facility for transport. The coastal districts are generally favoured for building up the trength of the colonies, but there are many suitable places along the slopes and plains which provide a useful service in this direction, especially on river country where there has been an ample rainfall to stimulate the growth and flowering of pasture and other plants.

Owing to stress of conditions on the tablelands, many colonies relinquished broodrearing about the first week in March, whereas they usually carry some brood through to the end of April. The winter season has been a long and difficult one for these stocks, and this is a particular instance where a move to a selected warm locality, to allow a brood-nest to be established as early as possible, should prove most helpful. The best time to move the bees to selected sites is usually during early August.

Where arrangements cannot be made to move the apiary, every care will need to be exercised to ensure that the colonies are made as comfortable and compact as possible in the hives, also that an ample supply of food is available to them. When field work is commenced in earnest it will prove most helpful if stimulative feeding is applied regularly, until a state of progressive brood-rearing is established.

#### An Abundant Supply of Pollen Required.

Evidence of increased activity of field bees, particularly in pollen-gathering, will provide a useful guide as to the progress of brood-rearing within the hive, and it is almost invariably observed that, where there is an abundant supply of pollen available, the best conditions prevail. Our wattles (Acacia spp.) are our best source for spring pollen supplies, and in any locality where they are not naturally well distributed, steps

should be taken, on permanent apiary sites at least, to plant a good number of the species. Amongst the most popular wattles for cultivation we find the Queensland Silver (Acacia podalyriaefolia), Cootamundra (A. Baileyana) and Golden Wattle (A. decora). Our wattles appear to adapt themselves to any climatic condition, at least within the range of country favourable to bee-farming.

During spring the survival of a colony of bees depends on its ability to establish sufficient brood early enough to ensure the replacement of old bees by vigorous young ones before the population becomes overweakened. The bee-farmer depends on sustaining his stocks through this difficult time, and enabling them to build up a strong force of workers for profitable honey-production during the season ahead.

#### Bee-farming in Cyprus.

THE accompanying photograph of an apiary in Cyprus was taken by one of our soldier bee-keepers when on a visit to the island. In a few places bees are kept in properly constructed frame-hives, but the interesting though primitive plan as shown in the illustration is still adopted.

The bees work in a cylinder from 9 to 12 inches in diameter, and about 2 feet 0 inches long. This cylinder is plastered with clay on the outside until built up to ball-shape, and when dry it is coloured white. A small entrance is provided for the bees and appears in the photograph as a black dot on the lower section of each hive in the apiary formation.

The prepared hives are set in rows one over the other, and all are plastered firmly together with dark clay; it is evidently a permanent apiary site. When extracting-time comes round, the rear of the cylinder is opened and the combs of honey, as may be obtained, are removed.

No doubt bees have been kept in this unusual way in Cyprus for ages. It should be of interest to observe the methods

employed to control the colonies during robbing operations. Our experience with bees imported from Cyprus, has proved that the variety is exceptionally excitable and temperamental.



An Apisey in Cypeus.

#### Estimate of N.S.W. Wheat Acreage, 1942-43.

According to a recent estimate made by the Chief of the Division of Marketing (Mr A A. Watson) approximately 3,300,000 acres will be planted to wheat for all purposes this season. This represents a decrease of 24 per cent. on last year's acreage. The estimate is based on reports received from district Agricultural Instructors and honorary crop correspondents in the main wheat growing areas.

Briefly, the present (17th June) crop position is as follows, states Mr. Watson:—

The dry spell was relieved by good, soaking rains during May and most districts in wheat producing areas have now received some relief. This moisture has resulted in a generally even

germination and as weather conditions have been unusually mild a vigorous early growth can be anticipated. It is reported that it is many years since such good rains have been experienced in the late autumn and the present wheat season has started off under very propitious circumstances.

Now that rain has been received late sowing is in full swing in many areas but it is expected that seeding will shortly be complete.

Weeds and black oats are prevalent in many crops.

The area sown is below that of last year in almost all districts. This fact is largely attributable to the dry conditions prevailing during part of the sowing period, shortage of suitable labour, and rationing of superphosphate.



# The Geologic Sources Of the Commoner Chemical Elements.

#### Their Agricultural Significance.

(Continued from page 199.)

A. N. OLD, B.Sc.Agr., Analyst.

#### HYDROGEN.

HYDROGEN, which some years ago came spectacularly before the public notice in connection with the Hindenburg-zeppelin disaster, has been known since the time of the alchemists, who called it "inflammable air." Turquet de Mayerne recognised it as a distinct substance in 1650. About 1781 the English chemist, Cavendish, demonstrated the synthesis of water by the combination of the gas with oxygen; this led his French contemporary, Lavoisier, to give it the name "hydrogen," meaning water-former.

#### Very Widely Distributed.

Hydrogen is probably as widely distributed throughout the universe as any element; spectroscopic observations have shown its general presence in the stars; our own sun contains a high percentage. On the earth itself, free hydrogen is found escaping from volcanoes and fumaroles, and it is present in small amounts in rocks and meteorites. The atmosphere, however, contains only a negligible amount of the free gas, due probably to the readiness with which it combines with oxygen.

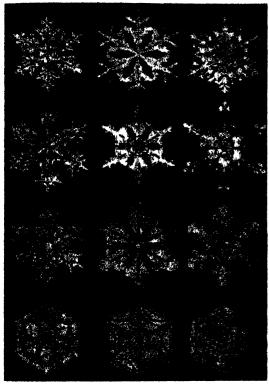
In combination hydrogen is very common; its oxide, water, contains one-ninth by weight of hydrogen. Water covers about three-fourths of the earth's surface and in addition is present in the atmosphere, in the soil, and in all animal and vegetable organisms. This makes it one of the most important and best known of all chemical compounds.

Ice, which is properly regarded as a mineral or, when in large masses, as a chemically formed sedimentary rock, occurs in the form of snow, frost and hail; on the surface of rivers, ponds, lakes and seas;

as ice-caps in the polar regions and as glaciers. Both water and ice are geologically important as agents of weathering.

#### Presence in Animal and Vegetable Tissues.

Hydrogen is present together with carbon, oxygen, etc., in almost all organic compounds, including those which make up animal and vegetable tissues; hence its presence in petroleum and coal. Hydrogen enters these organic combinations originally in the photosynthetic process of green



Photograph of Snow Crystals [After Bentley,

plants, which utilise the energy of sunlight in combining water (H<sub>2</sub>O) and atmospheric carbon dioxide (CO<sub>2</sub>). Hydrogen is present in all acids. Combined with sulphur, it yields sulphuretted hydrogen (rotten-egg gas) and, with nitrogen, ammonia. Phosphorus, iodine, bromine, fluorine, chlorine, etc., combine with it. The peroxide is well known as an antiseptic, oxidising and bleaching agent.

A very large proportion of minerals are, in their chemical composition, acid. basic or hydrous salts, and therefore con-

tain hydrogen, a fact which is frequently overlooked. Respective examples of these three types are KHSO<sub>4</sub>, or acid potassium sulphate; Cu<sub>2</sub>(OH)<sub>2</sub>CO<sub>3</sub>, basic copper carbonate or malachite; CaSO<sub>4</sub>, 2H<sub>2</sub>O, hydrous calcium sulphate or gypsum.

Hydrogen is the ninth most abundant element of the earth's crust, representing .9 per cent of the total weight. However, the hydrogen atom is the lightest of all, and if the relative number of atoms is considered, hydrogen takes second place with 16 per cent. of the total.

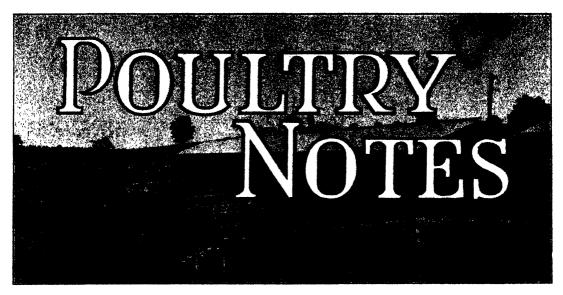
"Heavy" hydrogen, or deuterium, is an isotope of the element, approximately twice as heavy as ordinary hydrogen. "Heavy" water obtained from it is roughly ten per cent. heavier than ordinary water and has been shown to have a harmful effect on plant seedlings and cells. Another rarer isotope of hydrogen called tritium is approximately three times as heavy as ordinary hydrogen.

#### Hydrogen in Aeronautics.

The use of hydrogen in aeronautics depends on its lightness compared with air. It is 141/2 times as light as air, and 11,000 times as light as water. One thousand cubic feet of the gas will lift about 681/2 lb. The tirst hydrogen balloon ascended in France in 1783. Observation balloons were used in the French revolutionary wars, the hydrogen being prepared by passing steam over red-hot iron. The gas is also produced by passing an electric current through water, and by the action of acid on a metal. At the Paris Exhibition in 1878, a captive balloon of 883,000 cubic feet capacity was filled with hydrogen obtained by dissolving 80 tons of iron in 190 tons of sulphuric acid. Russian war-balloons in Manchuria during the Russo-Japanese war of 1904-5 used hydrogen prepared by the action of aluminium on caustic soda. All of these methods are costly compared with the modern one of decomposing steam with hot coke.

#### Burns at 2,000 deg. Cent.

Hydrogen burns in air, forming water, and develops a temperature of 2,000 degrees C. In the case of zeppelins being destroyed by fire, it is not surprising that even the metal framework tends to melt, as the melting point of aluminium is only 657 degrees (Continued on page 347.)



## Reserve Breeding Cockerels.

THE high prices ruling in the market at present for table poultry will no doubt hold for at least another month or so, and the temptation to realise on all the early hatched cockerels should be resisted by those who carry out their own breeding operations, as it is the early birds which make the best breeders for next season.

The best course is to raise all the cockerels bred from selected pens to an age when a preliminary selection can be made, which is about ten to twelve weeks. The culls can then be marketed and from time to time further cullings can be made as faults develop. It should be realised that even in well-bred flocks only about 25 per cent. of the cockerels hatched will ultimately be suitable for the breeding pens because it has to be taken into account that, apart from cullings for various faults, there will be casualties among the birds as they reach the quarrelsome age. Thus, large numbers of birds are required to be kept by breeders who are particular in their selection.

#### Raising Table Poultry.

The present high prices for table poultry are mainly due to the very heavy sales of birds which took place at the end of last year and early this year, also to the fact that very little autumn hatching was done. The increased demand for army requirements should result in fairly satisfactory prices being maintained for all but the latest hatched chickens, and those who have the facilities for raising market birds should be able to augment their income by retaining as many cockerels as they can handle instead of having the chickens sexed and disposing of the cockerels at the day-old stage.

#### Quality of Poultry Foodstuffs.

RECENTLY complaints have been received regarding the quality of poultry foodstuffs, and also to the effect that certain meals are being supplied by produce merchants as pollard. In this connection it is pointed out that under the Stock Foods Act it is necessary for the vendor of any manufactured stock food or of any by-product to affix securely and conspicuously to every pack-

age containing the stock food or by-product a label showing the following particulars:—

(a) The name and place of business of the wholesale dealer who manufactured or imported the stock food or by-product, or who was primarily responsible for placing the same on the market in New South Wales. (b) The distinguishing name of the stock food or by-product.

(c) The net weight of the contents of

the package.

(d) The chemical analysis required by this Act to be set out in the application for registration of such stock food or by-product.

(e) Such further particulars as may be

prescribed.

#### By-Products and Foodstuffs Defined.

The definitions given in the Act for byproducts and manufactured stock foods are

as follows:--

"By-products includes husks, bran, pollard, brewer's grains and materials produced from any kind of grain in any process of treatment or manufacture not being the primary object of such process and also includes any other commodity, substance, material or matter which may be declared by the regulations to be a by-product for the purposes of this Act."

'Manufactured stock food includes :--

- (a) All kinds of meals and foods for stock prepared whether in whole or in part from one or more kinds of grain, nut, or oils or juices or meats or other substances of a like nature; and
- (b) any condimental, patented or proprietary stock foods claimed to possess nutritive properties or nutritive as well as medicinal properties; and

(c) stock licks."

#### Standards for Bran and Pollard.

The regulations under the Act define the standard quality for bran and pollard as follows:-

"Bran shall consist of the outer skin or coating of the wheat or berry, pure and without admixture of any kind, obtained in the usual commercial milling process from wheat from which there shall have been removed all impurities by cleaning and scouring.

"Pollard shall consist of the products of the wheat grain or berry (other than flour or bran) obtained in the usual commercial milling process from wheat from which there shall have been removed all impurities and shall be of such fineness as to permit of 99 per centum thereof passing through a metal sieve having round openings of 1.5 mm. (one and a half millimetres) in diameter."

On account of the shortage of mill offals there are a number of substitutes being placed on the market and particulars of the ingredients should be shown on the labels. Poultry farmers should, therefore, examine all bags of foodstuffs supplied for the mash portion of the ration to see that they receive what they order. For instance, if pollard is ordered the bags should be labelled accordingly, but if some other "meal" is supplied as pollard, the purchaser would have grounds for complaint.

The label should show, not only the ingredients, but also an analysis setting out the minimum crude protein, minimum fats and maximum crude fibre.

In cases where the purchaser has good reason for doubting whether the commodity is according to label, he should notify the Department and the matter can be investigated by an Inspector under the Act.

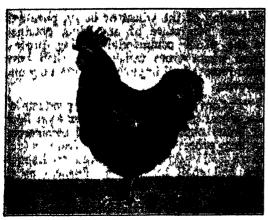
#### Hawkesbury College Field Day.

Till: annual field day for poultry farmers was held at Hawkesbury Agricultural College on 30th May, and while the attendance was not quite equal to previous years, due, no doubt, to transport and labour difficulties, there was no lack of interest in the various items on the programme.

As usual, one of the chief attractions was the male bird exhibition, and it was gratifying to see a decided improvement in the quality of the exhibits. Up till the last year or so, some of the groups were entirely lacking in essential utility qualities and breed character, but this year there were few birds which were not of a fairly high standard, and the winning groups were good examples of the combination of these qualities.

#### Practical Demonstrations Appreciated.

Exhibitors and visitors were given an opportunity to discuss the points of the birds, and the merits and faults of the exhibits were explained to them. A good deal of interest was displayed in this item of the programme, and it is felt that by



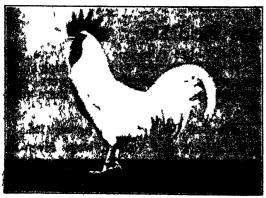
N. F. Judson's Champion Australorp Cockerel at HAC Field Day.

such demonstration new breeders can gain a knowledge of what is required in the selection of male birds to improve production and quality in flocks.

Other items which created much interest were demonstrations of the killing and dressing of poultry and of the correct method of conducting a post-mortem examination. The first mentioned was given by Mr. F. II. Hart, Poultry Instructor, and the other by Mr. F. G. Hungerford, Veterinary Officer, who also gave an address on lencosis in fowls.

#### An Amateur Judging Competition.

A judging competition, open to those who had not judged in any recognised poultry show, attracted forty-two entries. The entrants were required to judge, in accord-



C. Hill's Winning White Leghorn Cockerel in the Male Bird Exhibition at the Field Day.

ance with the utility standard, four cockerels or four pullets and place them in their order of merit, giving briefly the reasons for so placing them. They also had to show two of the main defects in each of the birds in their order of importance.

Afterwards a demonstration of the good and bad points of the birds was given by Messrs C. Lawrence and V. H. Brann, who had previously judged the birds

A subsequent examination of the judging cards showed that, while the winners appeared to have a good knowledge of the points of the utility standard, many others stressed purely standard points and overlooked utility characteristics.

In the Australorps pullet section no award was made, as none of the competitors placed the birds in their correct order. However, these competitions are of consid-



Killing and Dressing Demonstration at the Field Day

erable educational value and help to stimulate interest among new breeders. Those who wish to study more closely the utility standard can obtain from the Department a leaflet giving details

# Quality Points Awarded for Male Birds and Competition Pullets.

l'articulars of the points scored by the groups of three birds in the male exhibition, together with those awarded for the pens of pullets in the laying competition, are given hercunder. The aggregate of these points decides the winner of the C. W. Robinson Special Prize, subject to the pullets laying not less than 1,250 eggs, and each bird producing eggs averaging not under 24 ounces per dozen.



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Competitor.	Quality Points Awarded to Pullets in Competition.	Quality Points Awarded to Groups of Cockerels in the Male Bird Exhibition.	Competitor.	Quality Points Awarded to Pullets in Competition.	Quality Points Awarded to Groups of Cockerels in the Male Bird Exhibition.
Whit	e Leghorns.		White Legh	orns contin	ued.
Anderson, W. & N	59	1	Wimbleford Poultry		<b>,</b>
Argall, W. F	1	66	Farm	64	70
Bray, S. R	1	60	Young, H. G	63	
Bruce, W. H	1 -	1	Stevens, E. (Minorcas)	59	63
Cairney, J	1	·	, ( ,	.,,	3
Cardun Poultry Farm	63	1	A	des lanna	
Christie, R. G. & Son	61	50		tralorps.	
Cox, A. E	. 64		Anderson, W. & N	69	67
Daley, S. E			Broughton, R	59	•••
Dove, D. R	1		Dundon, W. H	63	
Dundon, W. H	. 64		George, A. & Son	57	67
Ellison, J. H			Harris, C	60	62
Fisher, C	59		Jacobs, R. A	59	
Fitzsimons, E		50	Jarman, T. E	63	63
Flew, J. L	. 61		Judson, N. F	71	71
Gilmore, N	. 50		Martin, S	60	62
Graham, Miss M	62		Minegold Poultry Farm	59	71
Greentree, A	61		Nova Poultry Farm	58	
Hankinson, J.		60	Paull, R. W	60	
Hill, G	64	(n)	Pitts Poultry Farm	60	
Hoe, W. H	1	68	Robinson, C. W	59	64
Hudson, T. I	59	1	Tyson Bros	65	• • • •
Jacobs, R. A	62	1	<b>-</b>		
Jarman, T. E	68	62	1.81	igshans.	
Kennedy, F. J	67	67	Harris, R. F	60	1
Kerruish, J	59		Nicholls, Mrs. F. C	62	
Knott, W	64		Nicholls, S	65	
Kraus, P	65		Wilson, R. D	04	62
Leach, C. & Son	1 6t				1
Martin, S	65	63	the same of the sa		**
McDonald, T		1	Dubbed	Bird Section	•
Minegold Poultry Farm	57	67	The points awarded	in the du	bbed cock bin
Mullens, F. B			class are given below, bu		
Newton, R	65	62	for the C. W. Robinso		
Payne, J. & Son	04				points.
Prendergast Bros			Argall, W. F.		65
Progress Poultry Farm	62	•••	Bray, S. R.		62
Ray, F	50		Hoe, W. H.		03
Riddle, Mrs. I			Jarman, T. E.		63
Robinson, C. W		63	Kennedy, F. J.		67
Smith's Stud Farm	61		Leach, C. & Son		50
Southern, J	1	61	Robinson, C. W.		61
Stein, R. G	The second secon		Wimbleford Poul	try Farm	67
Stuart, W. J			It will be noted tha	it two exhi	
Thoroughgood, R	65	.,.	same number of points,		
Tyson Bros			by taking the total nur		
Watt, R. L		63	the three birds, which		
Wilson, Mrs. M	58		I J. Kennedy, and 20 Farm.		



# Fowl Tick Fever

# Or Spirochaetosis Causes Heavy Losses Each Year.

 $\bigcirc$ 

THIS disease is most widespread in the western districts of New South Wales, where it causes considerable losses annually. Fowl, ducks and geese of all ages are susceptible and there is reason to believe that turkeys and pigeons may also be affected. There is apparently a considerable variation in the susceptibility of individual birds.

The causal organism is a micro-parasite occurring in the blood of affected fowls, and it is transmitted from bird to bird by the fowl tick (Argas persicus) or the red mite (Dermanyssus avium). The spirochaetes multiply in the salivary glands of the ticks, which may remain infective for at least five months. Fowls may also become infected by eating the affected ticks or the blood of another infected fowl. Fowls which have been affected with the disease and have recovered are immune.

#### Symptoms.

Symptoms develop in forty-eight hours after experimental inoculation, but in natural infections the incubation may be seven to nine days.

Sometimes the birds are found dead without any premonitary symptoms, but more typically, in acute cases, they are seen to be huddled up, with dark combs and wattles and showing greenish diarrhoea. They become paralysed and then die in a convulsion. Should they linger more than a

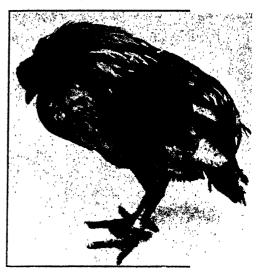
# FREE LEAFLET On Fowl Tick Fever.

This disease of poultry is dealt with more fully in Poultry Diseases Leaflet No. 4—"Fowl Tick Fever and its Carriers, the Fowl Tick and the Red Mite," by T. G. Hungerfert.

Write to the Department of Agriculture, Box 36A. G.P.O., Sydney, for a copy.

few days the initial darkening of the comb may give place to paleness due to anaemia resulting from the breakdown of the red cells in the blood.

Birds mildly affected present the typical picture of a sick fowl When they become paralysed it is usually only partial. Emaciation becomes marked and after about a fortnight they either die or begin to recover. Recovered birds will show anaemia and jaundice, the comb and wattles being pale and "waxy." They generally moult and will probably be slow in commencing to lay.



In the Early Stages of Fowl Tick Fever.

[After Schwanner.

When the disease occurs in pullets for the first time the mortality rate may be over eighty per cent.

#### Post-mortem.

The most noticeable features in birds affected with fowl tick fever are an enlargement of the spleen to as much as six times the normal size, its surface being scattered with patches of necrotic or dead tissue. The liver is also enlarged, with necrotic patches on its surface.

Actually field diagnosis is made by the association of the presence of ticks or red mite and the presence of greenish diarrhoea and paralysis in affected birds rather than on the post-mortem appearance. A veterinarian can readily diagnose the condition by demonstrating, microscopically, the causal organism in the blood.

#### Differential Diagnosis.

There are many diseases which cause listlessness, diarrhoea and wasting in fowls and which may be confused with spirochaetosis. They are leucosis (characterised by white nodules in the organs and tissues), tuberculosis (lesions like leucosis, but mainly in the liver, spleen and intestines), worm infestation (no paralysis, and worms readily seen in the intestines at post-mortem), pullorum disease (no paralysis, and post-mortem shows patchy colouration of the liver and discoloured misshaped ova), and chronic coccidiosis (no paralysis, and post-mortem reveals marked inflammation of the small intestines and cheesy material in the caeca).

#### Control and Treatment.

The obvious method of control is by eradication of the fowl ticks and red mites, thus preventing the spread of the disease. This is not as easily effected as may be at first thought, as the ticks shelter in the crevices of houses and nest boxes, between perches and their supports, and under the bark of trees, particularly pepper trees, those favourites of the fowl run with their very irregular trunks.

The failure of many owners to discover the ticks on their properties is due to the fact that the ticks usually remain in hiding during the



Piece of Old Splintered Wood Infested with Fowl Tick.

daytime and feed on the birds only at night. Hence a search with a torch at night may reveal them in cases where previous search with a knife in the crevices was unsuccessful.

The ideal type of fowl-house in those areas where ticks are prevalent is of galvanised iron over a framework of piping, with the perches suspended from the roof by No. 6 wire or steel

on to which a metal cup to hold kerosene is soldered. Failing this, only sawn timber should be used. Whitewash should never be applied, as the flaking off provides effective hiding-places for the ticks.

#### Treat the Fowl-houses.

When the construction of the house is reasonably sound it may be treated by filling in all crevices and painting all joints with boiling tar or wood preserving oil. Creosote or sump oil and other mineral oils used for orchard spraying are quite suitable for this purpose. As these preparations are very irritant, fowls should not be allowed into the sheds until they are thoroughly dry. Once the cracks are effectively closed the whole house should be sprayed with an insecti-cidal solution. One of the most common and satisfactory solutions is kerosene emulsion. This may be made on the farm by adding one gallon of boiling water to one pound of chopped washing soap and stirring until it is dissolved. When this has cooled, one gallon of kerosene should be added, stirring constantly to produce a creamy emulsion. Half a gallon of water is added to every pint of this solution prior to use. Strong solutions of sheep dip, five per cent, miscible red oil in water and eight ounces of chloride of lime to the gallon of water are all suitable solutions which are sometimes utilised.

Whatever solution is selected it should be sprayed with as much force as possible to drive the spray into any cracks. Spraying should be repeated at least three times at five day intervals, and it may be necessary to spray even ten times before examination reveals that the eradication has been complete. The importance of a thorough examination must be stressed, as ticks can live for over two years without feeding, and even red mite will live three to five months.

#### Guard Against Re-infestation.

Once the eradication campaign has begun, all crates or boxes entering the farm should be regarded as potential sources of re-infestation and should be saturated with kerosene emulsion, and any straw or shavings burned.

In cases where the present buildings are old or riddled with ants or borers, it will be found more economical in the long run to burn them and rebuild, as the complete extermination of the ticks from such structures is most difficult and in many instances impossible.

The treatment of individual birds is sometimes undertaken successfully by intravenous injections of arsenical compounds such as neosalvarsan, but such treatment should be attempted by a veterinarian only. In any case, the cost is prohibitive, except for birds of exceptional value.

#### DEATH OF MR. HENRY LACKIE.

THE death occurred at Moorebank, on 8th May, of Mr. Henry Lackie, aged 92.

Mr. Lackie first became associated with the Department of Agriculture in 1899, when he was appointed Inspector of Vineyards, following the discovery of phylloxera in vineyards in the vicinity of Camden. He played a valuable part in the fight against this pest, being later associated with the Department's viticultural stations at Howlong, Belmont and Raymond Terrace. In 1011 he retired from the Department and engaged in vine growing on his property at Moorebank.

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# PARAGRAPHS AND NOTICES.

#### How Britain Implemented Her Wartime Agricultural Policy.

"It is my belief that the question of increasing food production will never be solved unless we tackle it in the same thorough and bold manner with which it was handled in Britain from the beginning of the war," said Mr. E. H. Graham, Chairman of the N.S.W. Branch of the Australian Stud Pig Breeders' Society, recently. "At present confusion and chaos exists among producers because so many departments and boards are handling various phases of primary production. There is no clear objective, no defined policy. No department knows exactly what it wants, no producer knows what the country wants.

"In Britain, shortly after the outbreak of war, a Ministry of Food was created. This Department was charged with both the production and distribution of all foods, and it has done a marvellous job.

"Among other things, the Department launched a 'Dig for Victory' campaign and implemented it rigorously. It assessed the required production of the various things that could be grown or raised in Britain, and told farmers plainly what they had to produce. That necessitated the ploughing of over two million acres of grassland—a colossal task for one year—but the objective was not achieved by haphazard control of un-co-ordinated effort.

"Agricultural executive committees were appointed in every district, composed of sound, practical farmers, and these committees surveyed each farm from a production point of view. They formulated a production programme for each property, set the farmer a task, and compelled him to carry it out. Men who fell short of the required production from their farms were fined. Men who shirked deliberately were displaced and more capable men put on their holdings. In North Norfolk over 400 farmers were ordered to quit their holdings at the instance of the local agricultural executive.

"The excutives, for their part, helped every farmer to carry out the programme laid down for his farm. They gave financial assistance where necessary; they saw that man-power was provided if required; they found seed, fertiliser and expert advice in many instances. Most important of all, they guaranteed a price for the commodity produced.

"It needed a Minister with plenary powers to implement this scheme and to create the organisation of experts it demanded. But Britain found that in no other way could the production objective be achieved, and was bold enough to do it. Now, there is a full too per cent, co-operation of farmers in the plan.

#### Advice on the Feeding of Livestock.

Under the present war-time conditions, when the husbanding of our resources is a primary necessity, the care and maintenance of our livestock are more than ever important. Owing to the scarcity of some fodders and the desirability of utilising feeds such as wheat and barley in unusual quantities, feeding now presents difficulties not encountered in normal times, points out Mr. Max Henry, Chief of the Division of Animal Industry. As an aid to the solution of these problems, stockowners are urged to make full use of the help available

from the Department. It is suggested that stockowners advise the Department what foods are available to them, when a recommendation will be given as to the most desirable proportion of each for incorporation in the daily ration.

The postal address of the Department is Box 36A G.P.O., Sydney, but advice can be obtained direct from District Veterinary Officers, Inspectors of Stock, Sheep and Wool Instructors, and Piggery Instructors located in the various country centres.

#### Chemistry and Agriculture.

(Continued from page 339.)

C. Because of the dangerous nature of hydrogen, helium, which is non-inflammable, is now preferred for this purpose.

Because of its high temperature of combustion, hydrogen is used in the oxyhydrogen blowpipe devised by Hare, of Philadelphia, in 1801, for the manufacture of quartz glass, synthetic rubies and sapphires, for melting platinum, and in the autogenous welding of steel and other metals.

#### An Important Use of Hydrogen.

An important application of hydrogen due to M. Sabatier is in the "hardening" of animal and vegetable fats and fatty acids, those with low melting points being converted into others with a higher melting point, more suitable for the manufacture of candles, soap and margarine. Thus oleic acid combines with hydrogen to form stearic acid. Hydrogen under pressure is used also in the "cracking" of petroleum for gasoline production.

Perhaps the most far-reaching application of hydrogen is in the manufacture of ammonia (NH<sub>4</sub>) by combination with nitrogen, ammonia being required for the manufactures of explosives and alkali, for the refrigeration industry, and for the preparation of ammonium sulphate, an important agricultural fertiliser.

Colourless liquid hydrogen is obtained at the extremely low temperature of —252 degrees C., and at a still lower temperature, —259 degrees C., the liquid freezes, yielding white crystals of solid hydrogen.

#### Hydrogen in Exchange Phenomena.

The organic and inorganic colloidal fraction of a soil is the seat of important chemical processes known as base or cation exchange. The cations or positively charged atonic particles (ions) of calcium, magnesium, potassium, sodium and hydrogen occur adsorbed by the soil colloids, and they have the power, under appropriate conditions, of replacing each other. Acid soils contain an excessive amount of adsorbed hydrogen ions (an acid being defined as a substance capable of yielding hydrogen ions).

In correcting acidity by the application of calcium and magnesium compounds, hydrogen cations are replaced by those of calcium and magnesium. A measure of the acidity or alkalinity of a soil is provided by the pH scale in which values less than 7 are acid, those over 7, alkaline. Acid soils requiring enrichment with calcium and magnesium as by the addition of dolomite, are of widespread occurrence in eastern New South Wales, where heavy rainfall has leached the soil of these bases,

(To be continued.)

#### Plant Diseases.

(Continued from page 334.)

by dusting with copper carbonate, red cuprous oxide or copper oxychloride at the rate of 2 oz. per bushel or with "Agrosan" or "Ceresan" at the rate of 1 oz. per bushel.

The article on vegetable seed treatments for the control of many types of seed-borne diseases, which appeared in these notes last month, has been reprinted and copies may now be had on application to the Department of Agriculture.

#### New Plant Diseases.

DURING May, 1042, the following diseases were recorded for the first time in New South Wales:--

convolvulus purpurea, convolvulus:—mosaic and greening (virus). Syduey metropolitan area.

Nothoscordum fragrans, onion weed:—mosaic (virus). Sydney metropolitan area.

Salvia officinalis, sage. Heterodera marioni (Cornu) Goodey. Root knot. Castle Hill.

# Ergot Poisoning of Cattle

#### Prevalent on North Coast.

NEVER before in the history of the far north coast has ergot poisoning been observed over such a wide area and affecting so many cattle as has been the case this autumn, points out the Chief of the Division of Animal Industry of the Department of Agriculture, who suggests that dairy farmers should make themselves familiar with the symptoms of this condition and with measures that will reduce effects on the animals.

In some herds as many as half of the cows have been recorded as sick; fortunately mortalities have been light. The effect of this widespread occurrence of the fungus is that production is being severely affected in an area which produces a very large portion of the dairy produce of the State and in which the farmers are already faced with difficult economic conditions.

Some cattle show marked symptoms for as long as six weeks, though the average period is from seven to fourteen days. The first symptoms noticed are nervous irritability and twitchings of the muscles of the body and limbs. This condition progresses to shivering and is accompanied by incoordination of gait with stiffness of the fore-

limbs and a rolling gait of the hind-limbs. In some cases the head moves up and down and the tail swings laterally. The eyes have a stary look, and at times the animal adopts an attitude as if about to charge. Later the animal goes down, and if helped to its feet may stand for a time and then plunge forwards, due to collapse of the fore-limbs.

Cattle develop a craving for the infected seed heads and eat these to the neglect of the normal seed heads and leaf portions of the plants. There is no evidence of the establishment of immunity to ergot poisoning.

Withdrawal of the stock from ergotinfested pastures results in complete recovery. If this cannot be done, it may be possible to graze the animals on less heavily infected areas. If it is practicable, mowing of the heads before maturity is very effective, and burning of the pasture will destroy some of the spores and help to decrease the carry-over.

Drenching with  $1\frac{1}{4}$  lb. of epsom salts in 2 pints of water will help to purge the animals of the toxic substance.

#### Insect Pests.

(Continued from page 330.)

Flaked naphthalene, mixed well through the seed, at the rate of 2 or 3 ounces per bushel (60 lb.) prevents heavy infestation, and will protect lightly-infested seed from further damage. The seed should be examined every six to eight weeks, and a little more naphthalene added to replace that which has evaporated.

Fumigation does not prevent reinfestation of the seed, and where naphthalene is used it has the disadvantage of having to be examined every six to eight weeks. There are indications also that the germination may be affected by naphthalene, under some conditions, especially where it is used following fumigation.

In recent experiments conducted by the Entomological Branch, it was found that copper oxychloride I lb., or kaolin I lb., mixed thoroughly with I bushel (60 lb.) of

seeds, effectively controlled the weevils. Both sodium fluosilicate and ceresan at the rate of 2 ounces to the bushel were also found to give good control.

Every seed must be coated with the dust, as this covering prevents the small larvæ from eating their way into the seed.

Weevil larvæ already feeding within the seeds will not be controlled by these dusts, but will continue to develop and later emerge as adults. The dusts, particularly the copper oxychloride and kaolin, will prevent these adults from causing further infestation. The copper compound, sodium fluosilicate and ceresan are poisonous, and care must be taken in handling them.

Clean seed may be protected from infestation by storing it in stout muslin bags or large tins which the weevils cannot enter.

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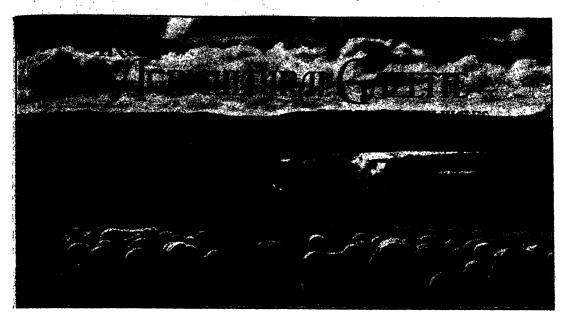
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#### The Agricultural Gazette.

August, 1942.

# WAR AGRICULTURAL COMMITTEES.

WAR Agricultural Committees have been appointed by the Minister for Agriculture (Hon. W. F. Dunn, M.L.A.) in twenty-eight districts in New South Wales. The immediate function of these committees is to organise all available labour for farming operations within their respective districts. Each committee consists of five members—two primary producer representatives, one urban representative, a paid secretary and the district officer of the Department of Agriculture. The latter will be chairman and will also act as organiser.

These War Agricultural Committees will be the central committees in the various districts, but for effective functioning they will require to form a number of small, active, local committees. This will be definitely necessary in handling manpower problems. It has been suggested that all existing agricultural organisations, including committees which have been recently formed, should act as local committees, and where there are several such organisations in a locality they should combine to form one local committee.

It is intended that the district committees will approach the manpower problems in the following ways: They will confer with and advise the

National Service Manpower Officers on all matters affecting rural production within their particular districts. They will arrange for the best use of remaining manpower on the farms by stimulating the formation of labour pools among groups of farmers. They will survey and use to the best advantage any casual labour available from towns and from local schools. They will make recommendations in relation to the use of members of the Women's Army and such other women's labour as might be available. So far as the handling of labour is concerned, the whole scheme has been worked out in closest collaboration with the Director-General of Manpower.

The successful functioning of these newly created committees will depend to a large extent on the abilities and the acceptableness of the men who comprise them. A no less important factor, of course, is the amount of co-operation afforded them by the rural and urban communities. So far as personnel is concerned, all confidence can be reposed in the Minister's choice. Each district was combed for the best men available; men of recognised abilities and respected judgment who were prepared to devote much of their time to a national job—a job which demands the setting aside of sectional and party interests.

It would appear that there has now been brought into being in New South Wales an organisation, in the main producer controlled, which not only should restore a full measure of confidence within the primary industries but should be capable of rendering valuable service in helping to smooth our many of the difficulties which so sorely beset our wartime agriculture. The Minister for Agriculture has set up very efficient machinery; it is now up to primary producers to keep it running. Manpower is the first job, but once functioning smoothly these War Agricultural Committees should, if called upon, be capable of achieving almost any objective in the field of primary production.



# The Care of Sick Animals. Importance of Correct Feeding and Management.

S. L. BLACK, M.R.C.V.S., District Veterinary Othcer.

In many respects stockowners possess an overabundance of faith in medicines for curing sickness in animals. Without a doubt, suitable medicines used with discretion can often assist greatly in the animal's return to normal health, but even then it is well worth emphasising that feeding and attention are frequently of more value than the actual medicines used. When medicines are employed in a haphazard fashion, as is often the case with proprietary preparations, they may be useless or even harmful. If the owner does not know what is wrong with the sick animal, and he desires to make use of some medicine, it is far better to adhere to the use of a simple safe laxative than to use a complicated mixture in the hope that its complex nature will effect a cure

The purpose of this address,\* however, is mainly to draw attention to the value of careful feeding and management in aiding the sick animal back to health. The importance of these factors in handling all animal ailments can hardly be over-emphasised

#### Isolate Sick Animals.

Most people living in the country notice how a sick animal will endeavour to get away by itself to a quiet place. This is a characteristic that applies to all sick domestic animals, and their endeavour to isolate themselves should not be lost sight of. Anything that the owner can do to assist the sick animal to find a comfortable place away from other livestock is well worth doing. It is then in a better position to rest without any fear of being disturbed, and

undisturbed rest can aid considerably in assisting it back to health.

The segregation of sick animals is also useful from another point of view. There is always the possibility that the illness may be of an infectious nature. Such being the case, isolation of the animal that is ill is a very useful precautionary measure until the cause of its illness can be determined, or until its recovery indicates that the sickness has been of a mild nature only.

<sup>\*</sup> This article is the report of a recent wireless address by Mr. 5 L. Black, over Station CY.

#### Correct Feeding Important.

Probably no factor is more important in the maintenance of health in animals or in aiding sick animals to recover their health than is diet. In this country we are constantly faced with the problem of dealing with cattle and sheep which are not properly fed and as a result have got into a low condition or become diseased. Although, generally speaking, a better position exists with regard to the feeding of horses, commonly enough the low condition of these animals is also sufficient evidence that they have had to go short of feed.

Until some system can be evolved to make the feed position secure, we must continue to face difficulties brought about by semi-starvation. To enlighten the farming and grazing community as to the disastrous consequences brought about by those factors which produce undernourished stock seems to be the first and important objective. When that is done, the time is likely to be near at hand when adequate efforts will be made to farm properly, to correlate farming with grazing, and to conserve adequate supplies of feed. This being done, and the number of stock grazed on holdings being such that the soil will not undergo depletion and wastage, then we should be on the verge of a new era in agricultural projects.

The dog is one animal in this country that is invariably well fed. Indeed, in many cases, it is overfed. Particularly is this so in respect of the dog kept as a pet. Many of these household pets would be in better health if they were restricted to one feed each day and all tit-bits entirely excluded.

#### Appetising Food For Sick Animals.

There are times when animals which are sick and weak have to be enticed to eat. When this is so, the food given should be as appetising as possible. For horses, a bran mash often constitutes one of the most appetising foods. In preparing a bran mash, salt should be included in the bran, and sometimes horses will take to it better if about 1/4 lb. of treacle or molasses is mixed in the mash. If the horse refuses the bran mash, as is sometimes the case, he may be tried with a bran and linseed mash, oatmeal gruel or even milk. A sick horse may refuse the other foodstuffs mentioned and yet take milk. If salt is added to the milk (about one dessertspoonful of salt to a gallon of

milk) it will make it more palatable for him. Sometimes a sick horse will not take any type of bucket food, but is prepared to eat a little grass, clover, lucerne or even raw carrots. Any of these are good to coax the appetite.

A sick cow can be offered the same type of food as a horse, with the object of encouraging her appetite. For a dog that is sick the food that is most suitable is usually milk, milk and porridge, or minced meat. Minced meat is more easily digested than whole meat.

#### A Practice to be Condemned.

Sometimes a distracted owner finds that the sick animal will refuse any type of food and in desperation attempts drenching the animal with foodstuffs in suspension or solution, such as gruel. This is a very bad practice, and one to be condemned from every aspect. Since the animal has no appetite it is almost certain that there is no flow of juices in the stomach and intestines to digest the food. The undigested food lying in the stomach is then liable to upset the animal, add to its sickness, and thus delay nature's healing methods. It is far better to wait until the animal has some desire to feed than to attempt compelling it to swallow any foodstuffs. In any case, there are certain digestive derangements such as impaction and scours that will show a quicker tendency to recover if no food is eaten or allowed to the animal for a period of forty-eight hours.

#### Supply Adequate Good Water.

Another important item to be watched in the caring of sick animals is that sufficient good water is available for them to drink. A sick animal will often show a greater desire for water and will drink oftener than one that is well. Water has a cleansing effect on internal organs and assists the body to eliminate waste and toxic products. The elimination of these products in cases of sickness is of great importance to the animal in overcoming its sickness.

#### Protection from Cold.

Also of great value in assisting the sick animal back to health is sufficient warmth during cold weather. Warmth may be provided through the agency of a shed or a rug, or both. Belts or clusters of shelter trees can also help when no shed can be provided. In supplying warmth the aim

should be to maintain the sick animal at as uniform a temperature as possible during the twenty-four hours.

With particular reference to rugging, it is much better to remove the rug when the day begins to warm up and replace it in the evening than to leave it on all the time. This advice also holds good with regard to animals that are in normal health. Quite often dairy cows are rugged night and day during the colder part of the year. The whole object of providing warmth is defeated when rugging is carried out in this way. Also, as the sun and fresh air have a cleansing effect on the skin, and have a tonic influence on the body, the animal will not derive full benefit from nature's gifts if kept rugged all the time.

Dogs, as well as the larger animals, also benefit greatly from warmth. The plaintive howl of the dog during a cold night or his shivering appearance in the morning could easily be prevented if the kennel be placed in a sheltered spot and suitably constructed to give warmth. Moreover, warm kennels give dogs greater resistance against colds and distemper, and, if a dog becomes sick, give him a better chance of recovery.

#### Should Sick Animals be Groomed?

As regards the question of grooming the sick animal, much will depend on the severity of its sickness. When very sick, it is better not to disturb the animal by grooming other than to remove any discharge that may have collected about the eyes or nostrils. Discharge of this nature is commonly enough seen with such diseases is distemper in dogs or influenza in horses. When the animal's sickness is not too severe, grooming of the body can have a useful effect in cleaning the skin pores, removing dirt and relieving any itchiness. This done, the animal will rest more comfortably.

#### Rest After Medicinal Treatment.

I have already referred to the value of undisturbed rest to the animal when sick. There are certain medicinal agents which, when used, make it of vital importance that the animal be rested subsequent to treatment. Oil of turpentine and carbon tetrachloride are two such medicaments. Both are commonly enough employed for treating worms in horses.

An instance comes to mind where an owner drenched his horses with a mixture of oil of turpentine and raw linseed oil, with the object of getting rid of worms. After the treatment, the horses were yoked up and worked hard for the rest of the day. As a result of this, one very good mare died and a second eventually recovered only after a severe illness. It is, therefore, important, after using a medicine such as oil of turpentine, to rest the treated animals for a period of twenty-four hours. When this is done, the greater part of the drug will have been eliminated from the body by the time the horse is put back into work. This is a safe and necessary precaution.

#### Treatment of Wounds.

In Australia, where there is such a scarcity of veterinary surgeons in country districts, an owner with a very sick animal often feels obliged to resort to some form of medicinal treatment on his own account. This is quite all right so long as care is taken regarding the agent employed, which should be incapable of harming the animal and should be first-aid in nature.

One common error noticed is the form of treatment used for cuts. Strong antiseptic solutions are sometimes applied to them day after day with the object, apparently, of destroying any infection present Strong antiseptic solutions have an irritating effect on cuts, and instead of aiding nature's healing methods actually delay healing. They may even be responsible for setting up certain complications in the cuts. In treating ordinary cuts it is quite sufficient to cleanse them first with plenty of clean hot water at about blood heat in temperature and then powder the cut surface with boracic.

#### If Veterinarian is Not Available.

If a stock owner lives in any part of the country where he cannot obtain assistance from a veterinary practitioner in dealing with sick animals, he can always consult the inspector of stock in charge of his district. However, the amount of official work to be attended to by the stock inspector does not enable him to make special visits to sick animals in his district, but if he is supplied with an accurate account of the nature of the symptoms shown, he can often give the owner useful guidance on the form of treatment to be adopted.



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# Guernseys.

#### "The Golden Butter Breed."

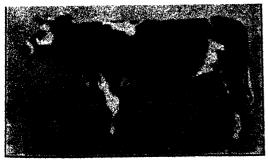
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THE Department of Agriculture has decided to make available a number of young Stud Guernsey Bulls—certified as having passed the T.B. and C.A. tests—for sale at Wollongbar Experiment Farm on the 19th of this month (see advertisement in this issue).

In view of the difficulty of importing fresh blood from overseas, farmers should cull out all unregistered grade or old bulls and seize this opportunity of obtaining a vigorous young bull. The Guernsey cow is known as the "Golden Butter Cow," and a Guernsey bull is always a gilt-edge investment.

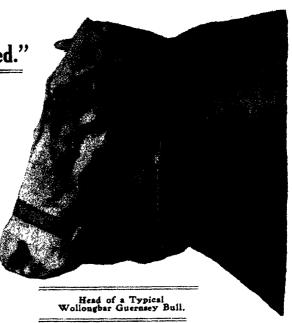
#### Single Purpose Breed.

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Isigny Cow.

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distinctly a commercial consideration. It is agreed that a dairy cow requires a certain ration for maintenance in direct relation to her size, and a supplementary one for production, varying with the amount of milk In this respect the Guernsey compares very favourably with the largerframed dual-purpose breeds, as her yield of milk is higher in proportion to her size than that of larger breeds. Furthermore, it is an acknowledged fact that the Guernsey does not require a rich pasture on which to feed, but can be seen in many parts of the country finding her living on pastures which are far from being the best, and in all seasons of the year the Guernsey is more adapted to grass and green forage crops than to dry feeding alone.

#### Origin of the Guernsey.

The monks of Les Vauxbelets Agricultural College, Guernsey Island, have made careful investigations with a view to tracing the origin of the Guernsey breed.

Although no proof can be advanced for the theory, they have reached the conclusion that the origin of the Guernsey is to be sought in the breed of Brittany known as the "Froment du Leon," a breed which still

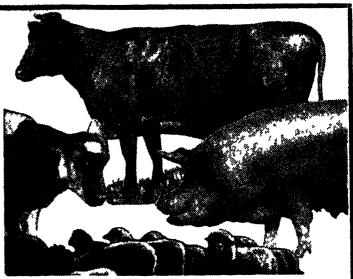
(Continued on page 379.)





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#### The Efficiency of

# Organic Materials in Supplying Nitrogen to Crops.

N. H. PARBERY, D.Sc.Agr., Analyst, and R. J. SWABY, M.Agr.Sc., B.Sc., Assistant Bacteriologist.

DIMINISHING supplies of nitrogenous fertilisers and the present increased demand for these materials in vegetable production have created a situation which makes it essential to utilise all materials whereof a reasonable proportion of the contained nitrogen can be converted in the soil to forms suitable for absorption by crops. The purpose of this article is to present a short account of experiments conducted by the authors to measure the extent and rate of release of nitrogen from some sixty organic materials.

Farm-grown substitutes for the efficient forms of nitrogenous fertilisers such as nitrates and ammonium compounds, which are now being used in the production of explosives, are not available in any quantity in New South Wales. Byproducts of industry, such as dried blood and meals of animal or vegetable origin, while efficient sources of nitrogen for the nutrition of plants, are in such demand as feeding-stuffs that they are unimportant in relieving the nitrogen shortage. In this State the conservation of animal manure, the production of composts or the pursuit of rotations designed to maintain soil fertility, have not been widely practised.

#### Leguminous Crops Vary Greatly in Quality.

There is a widespread idea that any kind of organic matter incorporated in the soil has a beneficial influence on plant growth, but this is not necessarily the case. That certain types of material can seriously impair soil fertility will be clearly demonstrated. Some plant materials are undoubtedly efficient sources of nitrogen, but a knowledge of the deleterious effects which others have on the availability of soil nitrogen and minerals, should make growers more selective of materials for incorporation and enable them to avoid the undesirable effects which follow the inclusion of some plant materials in the soil. The assertion that particular crops such as tickbeans, cowpeas and red clover are valuable green manure crops is not always justified, in view of the fact that their chemical composition may vary so widely as to make it hazardous to predict whether or not they will benefit following crops.

The nitrogen content of leguminous green manure crops is influenced by the nitrogen available in the soil and that contributed by the root-nodule bacteria. If these bacteria are ineffective or absent, then little or no nitrogen from the air is converted by their activities to forms usable by the plant. When this feature accompanies low soil fertility, crop growth is poor and its nitrogen content is low.

Nitrogen is released from the forms in which it occurs in plant material, as a result of decomposition by micro-organisms, chiefly bacteria and moulds. Their number and the chemical changes they bring about are controlled by the composition of the material (particularly its nitrogen content), conditions of temperature and moisture and the adequacy of the mineral supply.

The activities of the soil's microbe population are not always philanthropic; their demands for nitrogen in tissue building must be wholly satisfied before a possible excess is converted to forms which plants normally use.

#### Poor Quality Organic Materials Rob the Soil of Nitrogen.

In the presence of poor quality materials such as nitrogen-poor legumes, leguminous straw, straw, strawy fibrous crop residues, manure containing much straw or wood shavings, cane trash, maize silage or stalks, sawdust, bush scrapings, the roots of most crops and sugary or starchy substances, the supply of nitrogen, both within the materials and any released from soil humus, is quickly commandeered by the organisms. Nitrogen supply then is influenced by the time required for its release from dead microorganisms, the time during which nitrogen thus released will continue to circulate in new cells until the material is nearly completely destroyed, and the extent to which nitrogenous fertilisers, or nitrogen being released from previous organic accumulations in the soil, can help in re-establishing the situation. Recovery from artificially induced nitrogen starvation by the addition of materials containing little nitrogen, may require a very protracted period of time, especially where large quantities have been used. An investigator has shown that the inclusion of as little as 6 per cent. of straw in cattle manure, reduced the recovery of nitrogen therefrom through crops by more than 20 per cent. This amply demonstrates that manure containing much straw bedding may be valueless as a source of nitrogen.

#### Outline of Experiment.

The investigation was exploratory and took the form of a pot experiment, since a field trial is not adapted to the degree of control required in this type of work. The materials ranged from those having a low nitrogen content, such as maize stalks and broom millet, to those containing a high percentage of nitrogen, namely, fertiliser meals and dried blood. They could be classified as succulent to mature gramineous (grass family) materials, legumes of low, medium and high nitrogen content, a few weeds, animal manures, moderate to high nitrogen fertiliser materials, miscellaneous materials such as garden compost and leaf mould, and a number of mixtures of grasses and legumes.

The nitrogen content of a plant species is generally at a maximum when it is immature and succulent, and greatly diminishes with maturity. At any stage of growth there is a progressive decrease in nitrogen content in the complete plant and its separate parts in the order: leaves, whole plant, steins and roots. The dominant constituent, carbon, of the dry material of plants, is very constant in amount at all stages of growth, and in the whole range of materials of plant origin used in the experiment, varied only between 42 and 46 per cent. It is convenient to consider organic materials of the kind used, in terms of their carbon-nitrogen (C:N) ratio. Thus, a legume containing 44 per cent of carbon and 4 per cent. of introgen, has a C:N ratio of 44 - 4. Or 110.

44 -- 4, or 11 o.

The efficiency of the materials in supplying introgen to the test crop, proved to be related to the C: N ratio, those having high nitrogen and narrow ratios contributing much, and those with low introgen and wide or large ratios contributing little or none of their nitrogen. Thus, dried blood containing 52 per cent. carbon and 14 per cent of nitrogen, giving a C: N ratio of 37, contributed 73 per cent. of its nitrogen to the crop; and from broom millet containing 457 per cent carbon and 0.49 per cent. nitrogen, giving a C: N ratio of 9.3.3, no nitrogen was released. The organisms decomposing the millet robbed the soil of nitrogen, which in the absence of the millet would have been absorbed by the crop, to the extent of 71 lb. per acre, equivalent to more than 3 cwt sulphate of ammonia.

#### Pot Experiment Technique.

Having determined the nitrogen content, an appropriate amount of the individual materials to supply 150 lb. of nitrogen per acre 8 inches (24 million lb) of soil, was mixed with 35 lb. of a sandy loam which had been dolomited, fertilised adequately with minerals other than ntrogen, and placed in a porcelain pot of 3.4 gallons capacity. The basal application of 150 lb. nitiogen per acre was such as might be applied in a heavy green manure crop of satisfactory nitrogen content. Water to field capacity was added and losses during the progress of the work were compensated by the addition of water from time to time, as required, to bring the gross weight of the pot and contents to that at the outset. To prevent loss of nitrogen no dramage from the pots was allowed. They stood on planking placed on the soil in a situation out-of-doors exposed to full simlight and were covered during heavy rain to avoid waterlogging

Italian rye grass was planted and used to absorb the nitrogen liberated from the materials and the soil, and as a measure of the rate of release of nitrogen, successive cuts were made at varying intervals. Obvious differences in growth were visible three weeks after sowing, and at the first cutting, some lifty-nine days after planting, the vigorous crop on certain pots averaged to inches in height, whilst very stunted growth, unfit for cutting, was a feature of others (see Figs. 1 to 4). During the experiment four cuts were made when satisfactory growth on certain pots had occurred, and at its conclusion

the tops and roots were harvested together. The amount of nitrogen absorbed from individual pots at each harvest was determined after analysis of the dried rye grass. The experiment extended over the period from 16th April, 1941, to 22nd January, 1942, a total of 278 days.

#### Nitrogen Content of Successive Cuts.

A feature of the successive cuts was that only the first contained a high percentage of nitrogen. In the second cut the percentage of nitrogen fell to about half that of the first, and in the third it was again approximately halved. In the fourth and fifth cuts the nitrogen values diminished to a level sufficient only to support growth. To illustrate this point the percentage of introgen in the successive cuts from pots containing a few selected materials is presented in Table I.

TABLI I.—PLECENTAGI NITROGEN (DRY BASIS) IN SUCCESSIVE CUTS OF RYE GRASS.

Materials.	Days to first cut, and interval between successive cuts									
	50 days.	37 days	71 days	59 days	52 days					
	Per	Per ·	Per	Per	Per					
	cent	cent.	cent	cent	cent.					
French beans	6 21	2 74	119	0 95	0.61					
Field peas	4 18	2 21	1 10	0 99	0.85					
Yellow lupins	5 21	2 57	1 27	117	085					
Sovietans (high nitrogen)	5 84	2 61	1 45	7 18	0.75					
Soybi ans (nitrogen-starved)	Insuft growt bars	h to	1 75	1 22	0 90					
Bersim clover	5 70	2 54	1.26	100	0.81					
Black oats	5 12	246	1 21	1.05	0.95					
Peanut meal	6 40	3 15	111	0.84	0 70					
Dried blood	5 44	2 01	113	101	0.83					

Rye grass plants were so unthrifty on pots containing nitrogen-starved soybeans (Fig. 2), maire stover and broom millet (Fig. 3) owing to lack of nitrogen, that they were not cut until the third or fourth harvest of the other pots, when they contained a percentage of nitrogen similar only to the greatly diminished amounts in these later cuts. This feature is illustrated by the composition of the cuts from the pot containing nitrogen-starved soybeans in the above table. It has a possible bearing on the composition of pasture and fodder crops deriving a precarious supply of nitrogen from infertile soils. Unless an adequate supply of nitrogen for non-legumes is maintained, the high protein content demanded in the feeding of certain livestock is not achieved.

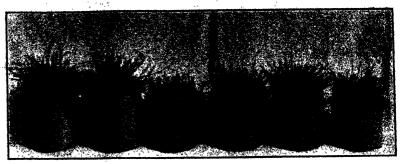
#### Nitrogen Recovery from Materials.

The percentage of nitrogen released from the various materials was calculated by adding the amounts of nitrogen absorbed by the successive growths of the rye grass, due allowance being made for the amount derived from the soil. The percentage of added nitrogen recovered in the successive cuts and the total recovery, from a few selected materials, are presented in Table 2.

Negative values, either at particular cuttings or as total return, indicate that no nitrogen became

Fig. 1.

Field peas,
Garden peas,
Soil only,
French beans, high nitrogen,
French beans, medium N,
French beans, haulms.
At first cutting.



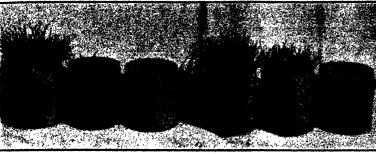
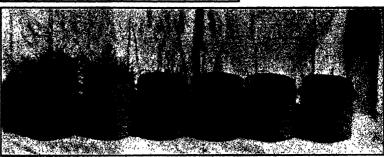


Fig. 2.
Young cowpeas,
Cowpeas and maize,
Maize stover,
Soybeans, high N,
Soybeans, low N,
Soybeans, N-starved,
At first cutting.

Fig. 3.
Black oats,
Oats,
Wheat,
Broom millet,
Maize stover,
Paspalum.
At first cutting.



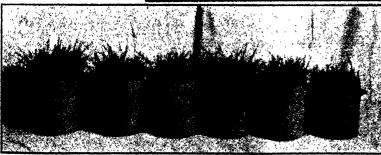
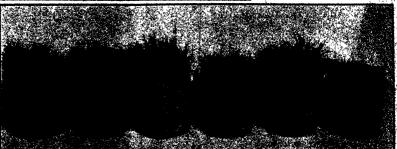


Fig. 4
Dried blood,
Peanut meal,
Castor meal,
Coconut meal,
Sulphate of Ammonia,
Soil only.
At first cutting.

Fig. 5.
The same pots as in Fig. 4
at second outting.
Note improved growth in
plants previously suffering
from nitrate toxicity.



available from the added materials, but that an equivalent percentage of the added nitrogen was drawn on from soil sources by micro-organisms

in the production of cell substance.

Legumes as a class, when used as green manure crops, proved no better sources of available nitrogen than their chemical composition indicates, those having a low nitrogen content eliminating soil nitiate for long periods, and those with a high introgen content readily yielding nitrogen in forms assimilable by crops. The common weed, "Fat Hcn," which has a lower nitrogen content than many of the legumes used, released its nitrogen more rapidly and completely than any legume other than Bokhara clover. Bokhara clover, despite a moderate nitrogen content, proved the most efficient source of nitrogen among the plants used, 58 per cent of that applied in this material being absorbed by the crop

TABLE 2.—Percentage of Added Nitrogen Recovered in Successive Cuts.

	Day	Γο <b>t</b> al.				
Material	59 davs	37 davs	71 days	59 days	52 days	278 days
	Per	Per	Per	Per	Per	Per
	cent	ent	cent.	cent.	cent.	cent.
Bokhara clover	23 50		6 20	4 67	5.98	58 32
Cowpea (mature)	- 3 57					
French bran (haulms)	10 18			5 71	8 11	
French bean (high					,	• •
nitrogen)	11 68	23.35	7 08	4 15	6 89	53 55
Lucerne tops	8 56		3 48	5 18	6.00	35.79
I uccrne roots	13 76	684	4 88	6 58	10 76	15-31
Field peas	1897	11.28	4 47	4 67	4 97	44.36
N Z blue lupins	15 35		5 22	5 10		
Tickbean	- 750	312	3.83	6 33	785	13.63
Soybean untrogen-	No.	ot i			1	
starved)	Darve	sted	35 24	2 25	3 17	29 82
Sovbean(high nitrogen)	22 45	16 51	4 34	3 07	7 70	54'07
Subterranean clover				i	1	
Mt. Barker	10 17	11 88	5 1 5	4 18	4 58	35.96
Paspalum (mature)	20 97	- 4 34	I 53	4 56	6 17	13 00
W heat (flowering)	20 to	1 26	7 881	6 34		- 202
	- 273	4 10	5 02	5 28		1923
Black oats (flowering)	11 42	5 24	3 66	5 67	5.35	31.54
Maire stover	No	ot i	33 18	2 67	6 73	-23.98
	harve		. 1	i		
Broom millet (mature)	Not	harves	ted i	42 72	- 4 53	47 25
Fat hen (thenopodium		1		1		
album)	17 86	22 501	6.30	4.05	6 41	57 02
l owl manure	27 52	14 04	3 54	3 68	2 69	52 47
Cow manure	3 68	0.68	1 34	2 36	4 99	13 05
Peanut meal	11 78	44 88	991	1 45	7 21	75.23
Dried blood	31 06	25 52	619	3 07	7 24	7 ; OK
Sulphate of ammonia	1412	52 3K	71	2 91	4 45	86 57
		_ [	(	1		

Good quality, high nitrogen, soybeans gave a high return (54 per cent) of nitrogen, but the nitregen-starved soybeans continued to utilise the equivalent of about 45 lb per acre of soil nitrogen at the conclusion of the experiment. The incorporation of the latter type of material even at the rate of 12 tons green weight per acre, which was the yield of the crop from which the sample was secured, would have drastically impaired soil fertility. Cowpeas at the stage of maturity when they would normally be ploughed in, and young lucerne, gave disappointing returns of nitrogen. Unlike other legumes, lucerne, when applied in quantity somewhat above what could be secured at a single cutting, has a toxic effect

on crops. The toxic substance is not present in the plant, but is formed during its decomposition. The low return of nitrogen from beans from which the pods had been picked, points to the dubious value of incorporating residues of this kind. The nitrogen of N.Z. blue lupins proved to be readily nitrifiable, since a sample of this crop was the only legume containing less than 25 per cent. of nitrogen which contributed more than 30 per cent. of its nitrogen to the rye grass.

In view of its low nitrogen content, black oats gave a high yield of nitrogen and was outstanding among the cereals. Young or succulent grasses which had not become fibrous gave a good return (young Phalaris 30, Kikuyu 40 per cent.), whereas mature, strawy grasses gave a low or negative return of nitrogen (mature Phalaris 13, mature rye grass 19, paspalum — 13 per cent.). The poorest quality gramineous materials (wheat — 2, maize — 24, millet — 47 per cent. recovery) contributed no nitrogen, and drastically immobilised soil nitrogen, resulting in an unthrifty, nitrogen-starved crop.

The main roots of cowpeas and Bokhara clover, with moderate nitrogen contents, yielded some nitrogen in the first two months, but a considerable period elapsed before the main roots of lucerne, with a low nitrogen content, gave a positive yield

The mixtures of a legume and a grammeous material, in which half of the nitrogen was supplied from each source, showed to no advantage. In a mixture of maize stover and young cowpeas, the decomposition of the former utilised the nitrogen made available from the latter. This fact shows to disadvantage the attempt sometimes made to rationalise the incorporation of maize trash along with an interplanted legume. The residues which grazing animals will not consume should be burnt.

A further example of the influence of succulence, fibre and nitrogen content on the efficiency of plant materials as green manure crops is presented by NZ. blue lupins. The easily decomposed leaves with a high nitrogen content, liberated nitrogen more rapidly than any other legume, whereas the fibrous, low nitrogen stems robbed the soil of nitrogen.

In the pot experiment, the intimate mixture of finely-ground stems and leaves of crops of moderate nitrogen content, such as tickbeans, cowpeas and red clover, differed from the distribution of leaves and stems of ploughed-in plants. The intimate mixture of moderate quality leaves and poor quality stems was an unavoidable artificiality, and probably the nitrogen content was reduced to a level where its liberation was, for a period, inhibited. This was possibly the case with tickbeaus, and leads to a consideration of the effect of plant placement in the soil following ploughing under. Where there is no close contact of stems and leaves, these being separated by some inches, it is conceivable that there are zones where nitrogen is being liberated from the leaves, only slightly removed from zones where nitrogen demand by

micro-organisms in contact with the stems is acute. Hence, under field conditions, there is a possibility of obtaining a small return of nitrogen from materials in which the nitrogen content of the whole plant might indicate a remote chance of an appreciable release.

The recovery of nitrogen from the high analysis organic fertiliser materials was of a high order: dried blood (73 per cent.), peanut meal (75 per cent.) and castor meal (68 per cent.)—comparing favourably with sulphate of ammonia (87 per

cent.).

No plant material containing less than 1.5 per cent. nitrogen gave a positive return of nitrogen during the whole period of the experiment. Nitrification was slow and not always positive among the materials containing from 2.0 to 25 per cent. An early return of nitrogen, coinciding with the demand of crops planted soon after their incorporation, was secured only when the nitrogen content of materials was above 2.5 per cent.

#### Conversion of Plant Nitrogen to Nitrate by Micro-organisms.

Soil micro-organisms decompose the nitrogenous constituents of organic materials, producing simpler forms, first ammonia and finally mitrates which can be estimated chemically and the rate of release of nitrogen determined. Thus the forms of nitrogen used by the plants may be determined by chemical analysis

The individual materials were added to small amounts of soil in the same relative quantity as in the pot experiment, and sampling and determination of the amount of amnionia and nitrate being formed, was carried out at regular intervals. This method was a valuable adjunct to the experiment in which rye grass was the absorbing agent. since it proved a rapid and accurate means of assessing the value of the various materials. The results obtained in the pot experiment were amply confirmed by the production by micro-organisms of usable nitrogen in a short experimental period of five weeks. Nitrate was produced from only two materials, viz., "Fat Hen" and high nitrogen French beans at the end of the first week, the "Fat Hen" producing the greater amount. Slight to complete suppression of soil nitrate was a feature of the first week of decomposition of most of the legumes, but almost the whole of the nitrogen not utilised by micro-organisms was made available from the better quality legumes in one month. The ammonia of sulphate of ammonia

THE Director-General of Man-Power has announced that the pig industry has been declared a protected industry for purposes of man-power regulations. This protection applies to pig raising, transport, slaughtering and other processing industries; also to bacon factories.

THE British Minister for Food announced on 24th June, 1942, that on the following

was converted to nitrate in two weeks. An amount of nitrate almost equivalent to the whole of the nitrogen recovered through the rye grass from the meals and dried blood, appeared in the soil containing these materials in one month. From a number of legumes no nitrate was produced after five weeks' incubation and their decomposition, as well as that of the poor quality gramineous materials, completely removed nitrates from the soil.

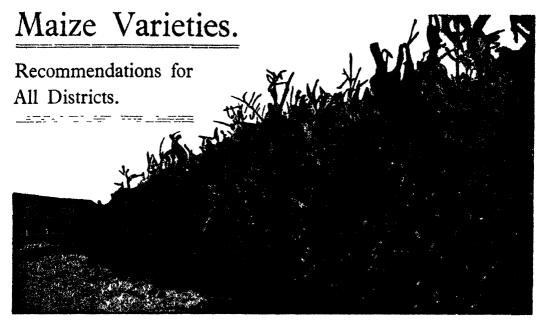
#### Growth Depression through Nitrate Accumulation in the Plant.

From certain materials with a high percentage of nitrogen, namely, peanut meal, castor meal, ammonium sulphate (Fig. 4) and high nitrogen French beans, the rate of nitrate formation was so rapid that toxic amounts accumulated in the rye grass growing in the pots containing these materials, prior to the first cutting. The plants were not vigorous, and were a dull grey-green colour. The amount of nitrate found in the affected plants was equivalent to about 6 per cent. of their dry weight. Following the first harvest the plants previously exhibiting nitrate toxicity grew vigorously, giving the highest yields at the second harvest (Fig. 5) and, moreover, exhibited a practical absence of nitrate in their tissue. The amounts of the high nitrogen materials applied were heavy, but the effect on the plants directs attention to the danger of supplying too much nitrogen in the early stages of the growth of a crop Recently examined stunted lettuce plants showing a dull green colour proved to contain excessive amounts of nitrogen.

### Relation between Type of Material added to the Soil and Time of Planting.

An early release of nitrogen is a feature of good quality, high nitrogen materials from which a large proportion of the nitrogen is recovered during the growing period of a crop. Hence if good quality materials are added to the soil, any delay in sowing or planting-out will lead to nitrogen wastage. If medium quality materials are added, planting should be delayed pending the destruction of most of the material and the nitimate release of nitrogen. Planting even several months subsequent to the incorporation of poor quality materials necessitates the addition, in normal times, of a liberal supplement of a nitrogenous fertiliser. The application to the avoided under all circumstances.

day large quantities of dried eggs would be on sale. These supplies, he stated, had arrived from the United States, Canada, Australia and the Argentine, and he added that already the equivalent of 228,000,000 eggs had been distributed to retailers. Lord Woolton called this dried egg distribution the largest piece of food re-organisation that has been done during the war.—N.S.W. Monthly Marketing Review, July, 1942.



W. D. KERLE, H.D.A., Special Agricultural Instructor.

THE following varieties of maize are recommended by the Department of Agriculture for sowing in the various maize-growing districts of New South Wales. Growers are reminded to make early arrangements for seed supplies, and if in doubt as to which variety to sow to communicate with the Department or get into touch with the local Agricultural Instructor.

# APPROXIMATE ORDER OF MATURITY OF VARIETIES RECOMMENDED.

Very Early.—Early Morn, Golden Glow. Early.— Wellingrove, Duncan. Golden Superb, Iowa Silvermine, Funk's Yellow Dent, Large Goldmine, Funk's Ninety-day, Grace's White, Hawkesbury White.

Midseason — Boone County White, Hickory King, Leaming, Golden Nugget, Golden Beauty, Murrumbidgee White, Manning Silvermine, Giant White, Manning Pride.

Late. — Yellow Hogan, Fitzroy, Large Red Hogan, Ulmarra Whitecap, Pride of Hawkesbury.

#### VARIETIES RECOMMENDED FOR GRAIN.

UPPER NORTH COAST.

(a) Tweed River.

Early Sowing.—Leaming, Wellingrove. Main Sowing.—Fitzroy, Manning Pride.

- (b) Lower Richmond River. Larly Sowing.—Learning, Golden Superb. Main Sowing.—Fitzroy. Second-class Soils.—Hickory King.
- (c) Upper Richmond River. Early Sowing.—Learning, Fitzroy. Main Sowing.—Fitzroy.

#### (d) Clarence River.

Early Sowing. - Learning, Golden Nugget.

Main Sowing.—Fitzroy, Golden Nugget, Golden Superb.

Late Sowing.—Golden Superb.
Second-class Soils.—Hickory King.

#### (e) Coramba District.

Early Sowing.—Learning, Golden Superb.

Main Sowing.—Fitzroy, Learning, Golden Superb.

Second-class Soils.—Hickory King.

#### (f) Bellinger River.

Early Sowing. — Learning, Golden Superb, Iowa Silvermine.

Main Sowing. - Fitzroy, Giant White, Golden Superb.

Second-class Soils.—Hickory King.

#### (g) Dorrigo District.

Main Sowing.—Learning, Grace's White. Sowing after Potatoes.—Golden Superb.

(h) Ebor District.

Main Sowing. - Wellingrove.

#### MIDDLE NORTH COAST.

#### (a) Nambucca River.

Early Sowing.-Golden Superb, Leam-

Main Sowing. -- Giant White, Fitzroy, Golden Superb.

Second-class Soils.—Hickory King.

#### (b) Lower Maileay River.

Early Sowing.—Golden Superb.

Main Sowing.—Fitzroy, Yellow Hogan, Leaming, Giant White.

#### (c) Upper Macleay River.

Early Sowing.—Golden Superb.

Main Sowing.-Fitzroy, Yellow Hogan, Learning, Golden Beauty, Hickory King, Giant White.

#### (d) Hasting River.

Early Sowing.—Golden Superb.

Main Sowing.—Fitzroy, Golden Beauty. Golden Nugget, Learning, Hickory King, Giant White.

#### (e) Lower Manning River.

Early Sowing -- Golden Superb.

Main Sowing.—Fitzroy, Learning, Manning Silvermine, Giant White.

#### (f) Upper Manning River.

Early Sowing.—Golden Superb.

Main Sowing.—Fitzroy, Learning, Golden Beauty, Manning Silvermine, Giant White, Manning Pride.

#### (g) Comboyne and Bulga Districts.

Main Sowing.—Golden Superb, Leaming, Hickory King, Golden Nugget.

#### (h) Wallamba District.

Early Sowing. - Golden Superb, Iowa

Main Sowing. — Giant White, Fitzroy, Golden Nugget, Learning, Manning Silvermine.

#### CENTRAL COAST.

#### (a) Gloucester District.

Early Sowing.—Golden Superb.

Main Sowing. - Fitzroy, Hickory King, Learning, Giant White, Golden Nugget.

(b) Lower and Central Hunter River.

Early Sowing. — Golden Glow, Golden Superb, Duncan.

Main Sowing.—Learning, Funk's Yellow Dent, Fitzroy, Golden Nugget.

Late Sowing.—Golden Glow.

#### (c) Hawkesbury River.

Early Sowing.-Golden Superb, Leam-

Main Sowing. — Fitzroy, Yellow Hogan, Manning Silvermine, Pride of Hawkesbury, Hawkesbury White.

#### (d) County of Cumberland.

Early Sowing. — Hickory King, Wellingrove, Golden Superb.

Main Sowing.—Fitzroy.

#### SOUTH COAST.

#### (a) Illawarra District.

Larly Sowing. — Funk's Yellow Dent, Iowa Silvermine.

Main Sowing .- Large Red Hogan, Fitzroy, Yellow Hogan, Giant White.

#### (b) Shoalhaven River.

Early Sowing. -- Golden Superb, Iowa Silvermine.

Main Sowing. -- Learning, Hickory King, Giant White, Fitzroy.

#### (c) Milton District.

Lurly Sowing. - Funk's Yellow Dent, Iowa Silvermine, Duncan.

Main Sowing. — Fitzroy, Learning, Hickory King, Golden Nugget.

#### (d) Moruya River.

Early Sowing. — Golden Superb, Early

Main Sowing.—Learning, Funk's Yellow Dent, Golden Superb, Hickory King, Giant White.

#### (c) Bodalla District.

Early Sowing.—Golden Superb.

Main Sowing. — Funk's Yellow Dent. Golden Nugget, Hickory King.

Upland Soil.—Hickory King.

#### THE AGRICULTURAL GAZETTE.]

(f) Bega and Pambula Rivers.

Early Sowing. — Early Morn, Golden Superb.

Main Sowing. — Funk's Yellow Dent, Learning, Giant White.

Upland Soils.—Hickory King.

(g) Towamba River.

Main Sowing.—Golden Superb, Golden Nugget, Learning, Hickory King, Funk's Yellow Dent.

Upland Soils.—Hickory King.

#### NORTHERN TABLELAND.

(a) Tenterfield District.

Hickory King, Wellingrove, Large Goldmine, Iowa Silvermine.

(b) Glen Innes District.

Strong Soils.—Wellingrove.

Light Soils. — Iowa Silvermine, Large Goldmine, Golden Superb.

(c) Ben Lomond, Llangothlin, Guyra, and Black Mountain Districts.

Golden Glow.

(d) Armidale District.

Wellingrove, Large Goldmine. Golden Glow, Early Morn

(e) Uralla District.

Hickory King, Large Goldmine, Wellingrove, Golden Glow, and Early Morn.

#### CENTRAL TABLELAND.

(a) Mudgec District.

Funk's Yellow Dent, Learning, Golden Superb, Hickory King.

(b) Colder Districts (Orange, etc.). Farly Morn, Golden Glow.

SOUTHERN TABLEI AND.

Moss Vale District.

Golden Glow, Early Morn, Hickory King, Golden Superb.

NORTH-WESTERN SLOPES.

(a) Inverell District.

Heavy Soils. - Funk's Yellow Dent, Wellingrove.

Light Soils.—Wellingrove, Iowa Silvermine.

Late Sowing. — Early Morn, Golden Glow.

(b) Tamworth and Upper Hunter Districts.

Early Sowing. — Early Morn, Golden Glow.

Main Sowing.—Wellingrove, Funk's Yellow Dent, Golden Superb.

CENTRAL WESTERN SLOPES.

Alluvial Soils. -- Funk's Yellow Dent, lowa Silvermine.

Upland Soils.—lowa Silvermine.

#### SOUTH-WESTERN SLOPES.

(a) Tumut District.

Main Sowings. -- Murrumbidgee White. Funk's Yellow Dent, Iowa Silvermine, Golden Superb.

(b) Gundagai District.

Funk's Yellow Dent, Murrumbidgee White, Golden Glow, Golden Superb.

MURRUMBIDGEE IRRIGATION AREA.

Funk's Yellow Dent, Fitzroy, Hickory King, Iowa Silvermine.

# VARIETIES RECOMMENDED FOR GREEN FODDER AND SILAGE.

UPPER NORTH COAST.

Fitzroy, Hickory King (second-class soils only).

Dorrigo District.

Leaming, Iowa Silvermine.

MIDDLE NORTH COAST.

Fitzroy, Hickory King (second-class soils only), Golden Nugget, Learning, Golden Beauty.

CENTRAL COAST.

Fitzroy, Golden Nugget, Hickory King, Iowa Silvermine.

SOUTH COAST.

(a) Illawarra District.

Fitzroy, Pride of Hawkesbury, Hickory King, Golden Nugget.

#### AUGUST 1, 1942.]

(b) Shoalhaven River.

Fitzroy, Pride of Hawkesbury, Hickory King, Golden Nugget.

(c) Milton District.

Fitzroy, Duncan. Golden Nugget, Hickory King.

(d) Moruya River.

Fitzroy, Hickory King, Golden Nugget.

(e) Bega and Pambula Rivers.

Fitzroy, Hickory King, Bega Yellow. Giant White, Golden Nugget

#### [THE AGRICULTURAL GAZETTE,

NORTHERN TABLELAND. Wellingrove, Iowa Silvermine.

CENTRAL TABLELAND.

Funk's Yellow Dent, Iowa Silvermine

SOUTHERN TABLELAND.

Moss Vale District.

Hickory King, Fitzroy.

Western and Southern Slopes.

Funk's Yellow Dent, Murrumbidgee White

#### Concrete's Part in Britain's War Effort.

TWENTY thousand silos for cattle fodder is the latest contribution of Britain's concrete makers to the war effort. They are now at work upon this colossal contract.

Farmers all over Britain have already put up silos; manufacturers of preserves are following suit with silos to store their waste materials and turn them into feedingstuffs to relieve the strain on the Empire's ship-

To-day more concrete is being used on Britain's farms than ever before. Concrete buildings, from barns to poultry houses, are being run up, and it is being used for water tanks, fence-posts, flooring, cattle troughs, guards and stalls, as well as asbestos cement for roofing sheds, rabbit butches and even buckets. The concrete industry is also helping the war effort with aerodrome runways, some of which need 60,000 sq. yds. of material at a time, and thousands of concrete huts are being set up for the Service departments and for the housing of war workers and the homeless.

All constructional repair work on railway and water tunnels is carried out in concrete, sometimes with complete pre-cast arches. Cellars of damaged houses have been concreted and made into water storage tanks. Concrete railway sleepers and pit props for coal mines are replacing imported timber. Hollow concrete blocks are being used not only for building but for air raid protection.

The upper works of ships have also been given concrete protection, and, following upon the construction of 100 concrete barges by the Admiralty, the first ocean-going liner of 2,000 tons deadweight has been success-

fully launched.

Machine gun posts, air raid shelters, oil storage tanks, defence barriers, telegraph poles, groynes, buoys and sinkers for moorings, and even anchors, are all being made of concrete for the war.

#### Black Beetle Pest of Maize and Vegetables.

COASTAL maize growers should not need to be reminded of the damage caused by black beetle to early-sown crops, writes Mr. T. McCarthy.

Chief Entomologist.

The position is that while there can be no guarantee that early-sown crops will not be attacked whatever the precautions taken, crops not sown until November suffer little or no injury. In most cases nothing is gained by early sowing where black beetles are numerous; usually the young crops are eaten out, necessitating resowing and involving loss of labour and seed.

Early cultivation in preparation for maize is good practice for either early- or late-sown crops. Those who for some reason or other decide to risk an early-sown crop will find that early soil preparation may help to prevent attack by black beetle, although as already stated there can be no assurance that the crop will not be attacked. If an early crop is contemplated and the ground has not already been cultivated, the work should be commenced as soon as possible and cultivation to keep the area free of growth continued until the crop is sown.

Vegetable growers would be well advised to follow the same practice, as the black beetle also attacks many vegetable crops.

#### Are You in a War Savings Certificate Group?

### Approved Seed.

#### August, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department. and if it is approved his name will be listed in the Department and information will be supplied regarding it to inquirers.

Cauliflowers

Shorts-H Burton Bradley, Sherwood Farm, Moorland.

Cauliflowers -- (continued.)

Hawkeshury Solid White—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Phenomenal Five Months—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Tomatoes.

Bonny Best — Manager, Experiment Farm,
Bathurst. (4s. oz. posted.)

Marvana — Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta. Break-o'-Day-Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta. Australian Earliana—Rumseys Seeds Pty. Ltd, 331 Church-street, Parramatta. Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Reans. Tweed Wonder-H. P. Richards, "Sovereign-

ton," Tenterfield. Pumpkins.

Old Blue-R. C Morandini, Box 74, Post Office, Dubbo.

#### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:-Cauliflowers-

Hawkesbury Solid White, Nugget, Shorts. Onions-

Hunter River Brown

I omatoes-

Australian Earliana, Bonny Best, Improved Walker's Recruit, Red Marhio, Salad's

Special Pumpkins-

Queensland Blue.

Beans-

Tweed Wonder, Brown Beauty.

Grasses, etc.-

Phalaris tuberosa, Subterranean Clover (midseason), Sheep's Burnet, Lucerne.

Provision has been made under National Security Regulations to limit the retail selling margins of apples and pears. Following are the maximum margins allowed on

cost to retailer: --

THE wheat conference held in Washington has resulted in approval by the governments of Argentine, Australia, Canada, United Kingdom and the United States of a memorandum of agreement as a first step towards the conclusion, as soon as circumstances permit, of a comprehensive inter-

Single cases—25 per cent. Half-cases--33 1/3rd per cent. Less than half-case—50 per cent. -N.S.W. Monthly Marketing Review.

national wheat agreement involving 100,000,000 bushels. The agreement contemplates establishment of a wheat pool for inter-governmental relief in war-stricken and other necessitous areas as soon as the international situation permits.—N.S.W. Monthly Marketing Review, July, 1942.

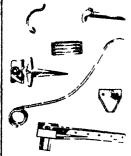
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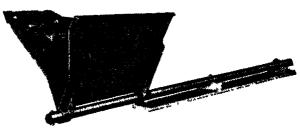
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### Re-working Apple and Pear Trees.

H BROADIOOI, Chief I ruit Instructor and I C WHIIIAKIR, Packing and Grafting

THERE are few apple and pear growers in New South Wales who have not found it necessary at some time to work over a number of trees to a different variety for one reason or another. Growers cannot afford to tend unprofitable trees, and, due in no small measure to the heavy production of good commercial varieties of fruit, little or no demand remains for less attractive varieties. Again, there are the growers in some districts who have made extensive plantings of popular varieties, only to find that, owing to unfavourable soil and climatic conditions the trees have proved unprofitable. The Jonathan apple planted on the Murrumbidgee Irrigation Area, provides a very striking example of these circumstances, fruit of this variety from this district being of very poor quality in comparison with Jonathans produced in, say, Orange, Hartley, Ratlow and some other districts.

there are, too, varieties which are quite suitable for export but which, generally speaking, cannot be considered profitable when the fruit is being grown for local consumption. The elimination of a number of varieties from the export list (a very wise move) added greatly to the number of trees to be worked over—not to such an extent in New South Wales as in other States, for in this State the greater number of apple trees which required to be re worked were varieties on the export list but being grown in unsuitable districts.

#### Treatment of Unprofitable Trees.

In the treatment of unprofitable trees, the grower has two alternatives, viz —

- (1) Grubbing out the trees and replanting with desirable and suitable varieties, or
- (2) Re-working to desirable and suitable varieties

In each case great difficulties may be encountered, and neither should be undertaken except under very favourable circumstances.

In a consideration of replanting, much depends upon locality condition of soil, etc. If the soil is badly eroded, or the plant food or the humis content is depleted, as is the case in many of our older apple orchards, growers would be well idvised not to replant until the land is brought back to a good state of fertility. In any case, growers are frequently averse to replanting, even under very lavourable conditions, as the operation entails considerable cost and long delay in bringing a new area into a state of productivity

On the other hand, when trees are weak and stunted, or showing signs of distress, re-working is not advisable, as the best of grafts cannot be expected to do well upon trees that are wanting in vitality. When the conditions are favourable, re-working by grafting has generally been recommended by the Department, and has been largely adopted by growers.

#### Systems of Grafting.

Until a few years ago the system of top or stump grafting was practically the only method followed, and many thousands of trees treated in this way are now carrying good crops of fruit in apple and pear growing districts. During the past few years, however, various wood rot fungiparticularly Polystictus versicolor and Schisaphyllum commune—have become increasingly troublesome. The severe deheading necessary for the old system of grafting is a contributing cause to invasion by these rots, and, generally speaking, this method of re-working is risky, to say the least of it; although, provided a grower is willing to go to some little extra trouble it is still possible to make a very satisfactory job of stump grafting in many districts, and particularly the drier ones.

However, a system of re-working trees which renders them far less susceptible to attack by wood rot fungi, and in addition results in the trees cropping again several years earlier than those worked by the stump method, has been developed. This system is known variously as side-

well only partly to complete the job, leaving the tops and all small limbs to be cut off at the proper time. If a tree is totally denuded of all prospective leaf-bearing surface during the winter, it will often be found that the bark will not lift until well after the time at which it would in the ordinary course of events—thus reducing the grafting period.

The trees may be completely stripped of all spurs, laterals and small branches, and the whole framework side-grafted, or an alternative method is to retain all suitable small limbs and laterals in good positions, and graft them by one or other of the methods described later—filling in where necessary with side grafts.

Of the two methods, the latter is undoubtedly the better, as there does not seem to be any good reason for cutting out small limbs, etc., in good position. Doing so simply means that the tree-has extra wounds to heal over, and no time is



Fig. 1.-Portion of a Block at Orange in which Fameuse has been Refurnished to Delizious.

grafting, re-furnishing, frame-working, etc., and though the actual details of the operation may vary slightly according to the operator's ability and views, the principle is basically the same—i.e., to retain as much of the tree's original framework as possible or desirable, and replace the fruit-carrying surface of the tree with the desired variety. Naturally, this method is more costly than the old way, but its advantages more than compensate for the increased initial expense

#### THE RE-FURNISHING METHOD.

#### Preparation of Stock Trees.

As a general rule, it is desirable to delay the stripping of the stock tree until just prior to grafting, but if for any reason it is necessary to strip before this, say during the winter, it is as

gained, as usually a scion has to be inserted to replace the limb. It is a sound practice also—particularly if the grafting is being done fairly late—to leave a few spurs, etc., scattered along each limb to draw the sap and to help in the prevention of sunburn.

The height at which to top the limbs is largely a matter for the individual grower's own choice, but as a general rule and with average trees, it is suggested that the topping be done at a point on the limbs which does not exceed 12 inches in diameter.

The matter of spacing the scions should be kept in mind when stripping the trees, if it is desired to utilise laterals and small limbs, etc., for stubgrafts. It should be remembered that the idea is not necessarily to re-furnish the tree with approximately the same number of spurs, laterals, etc., as appeared on the original tree. Most of the

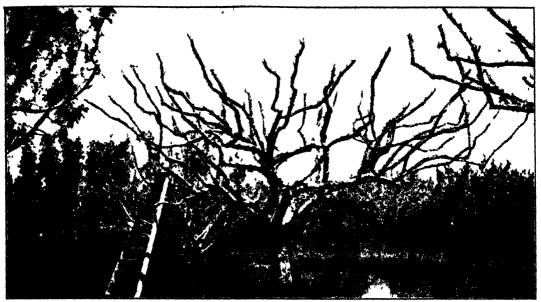


Fig. 2.—A Fifty-year Old Apple Tree Worked to Delicious. Season 1937.

Approximately 1 000 801005 were used.

new grafts, if treated correctly, will develop, if required, into small limbs, thus, it is needless waste of time and material to put on more scions than required

Generally speaking, if the scions are spaced 8 to 10 inches, or even 12 inches, apart there will be ample for the purpose, and on large old vigorous trees this distance may be increased to even 15 to 18 inches and still provide all the bearing surface required.

#### Selection and Storage of Scions.

Both these items are of great importance, and a little extra time spent on them is well worth while When selecting wood for grafting purposes, carc should be taken that it is obtained only from the best type of trees available, i.e., mature trees which have consistently borne heavy crops of good quality fruit. Select only well-matured wood of the current season's growth, with well

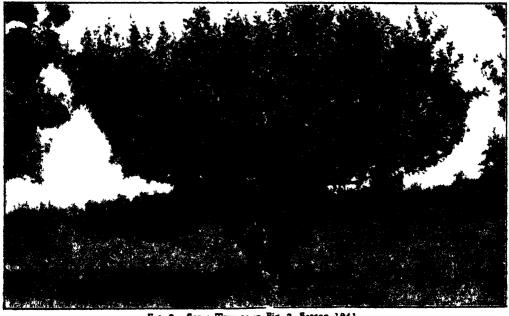


Fig. 3 .- Same Tree as in Fig. 2 Season 1941.

developed buds and free from pest or disease. The best developed buds are formed on about the centre half of a lateral; therefore, avoid using the butt ends or tips, if possible.

Laterals carrying weak or latent buds, and also strong growing water-shoots, should be avoided.

A good supply of scions should be collected, as it is poor policy to skimp the grafts, and the selected wood should be of varying thicknesses—the larger ones for strap and stub-grafts and the remainder for bark side-grafts.

Several methods of storing scions, until required, have proved satisfactory and simple. If cool storage facilities are available, the scions may be simply tied in bundles and held at ordinary fruit



Fig. 4.—Fameuse Worked to Delicious, Season 1937.

The top of each limb has been strap graited, and the remainder of the tree side grafted

temperatures for short periods. For comparatively long storage periods, however, it is advisable to pack the wood in layers with moist sand in boxes.

If cool storage is not available, or for any reason is not convenient, the scions may be buried in a cool, moist place until required. The spot selected for burying the scions should be well drained, and, if long storage is desired, should be in such a position that the sun does not shine on it. The wood may be completely buried, being spread out in a fairly thin layer on the bottom of the trench and covered with hessian

to prevent it becoming too dirty, and at least 4 or 5 inches of soil placed on top. Heeling-in the scions to about half their length is satisfactory for short periods, provided the site chosen is cold and free from the sun. All scions for keeping should be cut from the tree as late as possible, but whilst still completely dormant.

#### Time of Grafting.

With the ordinary method, of using only bark side-grafts, the work should not be commenced until the bark of the stock tree will "lift" freely. The work may continue so long as the scions remain in good condition, but some care is necessary in the case of late grafting, owing to the danger of sun scald before the trees can develop enough

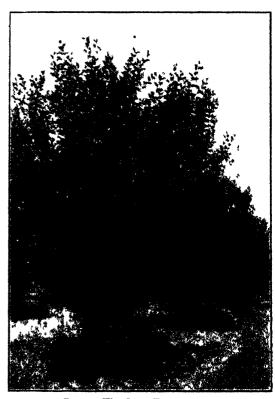


Fig 5.-The Same Tree, 1941.

foliage to protect the limbs adequately. By using all suitably placed small branches, etc., for stubgrafts, etc., it is possible both to lighten the work during the main grafting period, and to extend the season considerably without running the risk of sun-scald damage

In the case of wood-grafts, such as the wedge, whip tongue or the side cleft, it is not necessary to wait until the sap is flowing freely and so by using this type of graft on the stubs retained, a good proportion of the job may be done just prior to the commencement or during the early part of the sap flow, leaving the tops to be strap-grafted and any spaces between stubs to be filled in with side-grafts at the normal time.

#### Grafting Mastics.

The primary purpose of any mastic is to exclude the air and moisture from wounds caused by inserting the scion, but at the same time the substance used must be free of any matter likely to injure the wood or bark tissues of the tree, and elastic enough not to retard the formation of the new callus which forms around the cut areas.

The principal grafting mastic used in the past was a compound of beeswax, resin and mutton fat or linseed oil in various proportions, but during recent years several proprietary lines have made their appearance on the market—the main ones being heavy crude petroleum jelly and a bituminous compound known as "Colgraft" Both of these may be used cold, unlike the old grafting wax, which is usually heated before use.

Petroleum jelly is a particularly handy mastic for use when re-furnishing. It is usually applied to the wound with the finger, and as little as possible should be used, provided the wound is effectively scaled. Trouble has occurred at times from using it in too liberal quantities, or from using a too refined grade. Only the heaviest crude jelly should be used, otherwise there is a tendency for it to melt and cause damage to the tree tissues during hot weather. "Colgraft" is painted on the wound with a brush, and hardens to a rubbery consistency on exposure to the air. It should be used as "neat" as possible, so long as it can be applied smoothly, and should be thoroughly stirred before using. If necessary, it may be thinned with water, but the latter should be used very sparingly. A good thick coat should be applied over the wound

Trouble has occurred at times owing to cracking before the scions have "taken," but usually this is due to the too liberal use of water, result mg in too thin a mixture or too thin a coating being applied to the wound. It is a good mastic for large wounds, such as result from stumpgrafting, and is also a very good dressing for saw-cuts and tree wounds generally, since it has excellent covering and lasting properties. For this latter work it may be thinned down somewhat to enable it to be brushed on more easily

"Mastic I.," which has appeared on the market, is an improved petroleum jelly, it is less "tacky" than the jelly and hardens slightly on exposure



Fig. 6.—A Limb Completely Refurnished by Means of Stub-grafts.

to the air, and thus is better able to withstand the heat of the summer.

It must be emphasised that whatever substance is used, considerable care should be exercised during the sealing operations, as if only a very small hole is left around the scion, the main objective (i.e., the complete exclusion of air) is not attained, and there is a good chance of a "miss."

(To be continued.)

#### PRUNING THE VINE.

C. G. SAVAGE, R.D.A., Chief, Division of Horticulture.

THE vine is pruned on three general systems—the Gooseberry Bush or Goblet, the Cordon and the Espalier—with variations of each. The fruit wood is spurred, or left as rods or cames, according to whether the fruit is carried upon the growths that arise from the buds towards the base of the fruiting wood or from the buds situated further along the cames.

The vine bears the greatest proportion of its fruit upon current season's growth which is growing directly out of wood produced during the preceding summer, which in turn,

is growing directly out of wood which developed a year earlier. That is, fruit is borne where there is a direct connection of the growth of three consecutive years. For example, the grapes that will be gathered in 1942-43 will be borne on shoots which arise directly from wood of 1941-42 season, which, in turn, is growing from wood which grew in 1940-41 season.

The annual wood of the vine may be described as fruit wood, water shoots, and suckers. The fruiting wood is one-year-old wood arising directly out of the wood of the

previous year's growth.

The term water shoot is applied to shoots that arise directly from wood that is more than two years old. The usual treatment of such wood is to remove it completely, care being exercised to see that the base buds are destroyed. In some cases the shoot is required for replacing an extended or spent secondary arm. The method of treatment if the water shoot is required is explained later in this article.

By suckers are meant all shoots arising from the stem below the soil level or from the root system. These shoots should be carefully removed so that all base buds are destroyed in order to prevent further suckers

developing.

#### The First Two Years.

The pruning of the vine is the same for all three systems during the first two years.

When planted out the vines should be pruned back to a single spur of two buds, and during the first summer the vine is generally allowed to grow undisturbed in order to encourage the development of a good root system.

At the next winter pruning, the vines are again reduced to a single spur of two buds, unless they are exceptionally strong when the first portion of the main stem may be built in.

During the following spring all shoots except the two growing from the spur are rubbed off as they arise. The two growths are retained and tied to a stake until the brittle stage has passed, when there will be little danger of the shoots being broken off by wind. One shoot is then removed and the remaining one encouraged to grow.

From this stage the treatments in the training of the vine on the various methods differ.

#### Gooseberry Bush or Goblet-shaped Vine.

This system is used for vines that are grown without a trellis, the vines being framed close to the ground with the arms radiating outwards and upwards in the shape of a goblet.

With this system the vine is usually framed with a stem of 9 to 12 inches. After the growth during the second summer has reached some 15 inches or more in height, it is headed back to the required height at which the crown is to be built in.

Growths will arise from the remaining The lower ones should be cut away and the four or five at the top of the shoot should be retained. At the next winter's pruning these shoots will form the base of Two to four, spaced evenly the arms. around the stem, are selected pruned back to within a few buds of the base, preferably to side buds, all other shoots being cut away. The following season further shoots are selected which are usually pruned back to two-bud spurs. vine is trained with six to twelve secondary arms according to its strength.

The fruiting wood is usually reduced to two-bud sours, though at times, to produce high quality table grapes, the spurs may be

pruned to one bud.

#### The Cordon System.

The cordon vine is one that is trained with a single arm on a trellis. This system is found of especial service in districts where heavy winds are experienced, and under such conditions the vines should be trained in the direction away from the prevailing wind.

Where vineyards are planted on hillsides and the vines are trellised, the cordon system will be found advantageous. The vines should be trained with the arms pointing up the hill; as the sap moves readily up the hill, it will flow evenly through the stem. If the arm is framed down the hill, the end of the arm will not receive the same amount of sap as the portion nearer the stem, consequently the growth will be very irregular.

The height of the trellis, also the number of wires used will vary according to the variety of vine; for instance, with sturdy vines such as the Muscat Gordo Blanco, a low trellis of a single wire may be erected as the growth is stiff enough to support itself without the aid of a top wire. With Zante currant vines, two wire trellises are advocated (as the growth is very strong and inclined to be willowy), the arm being framed on the lower wire, the top wire supporting the growth during the summer. The

sultana vine, which requires rods, is usually trained on a three-wire trellis. The vine is framed on the middle wire; some canes are secured to this wire and the remainder taken down to the bottom wire; the top wire supports the growth during the summer.

In training the cordon vine, the single shoot that has been selected during the second summer is allowed to go untopped until it has reached the wire on which the arm is to be framed. It is then trained along the wire. At the third winter pruning the shoot is cut back leaving the last bud on the under side of the arm. Do not leave the arm too long, as some of the buds will fail to shoot, and blank spaces are likely to be formed on the arms. The value of the last bud being under the arm is that the growth for the extension of the arm will arise from it in a more or less gentle curve; the extension next winter can be placed on the wire without causing a bend in the arm. If the last bud is left on the top or side of the arm the new shoot grows straight up. Then in the following winter great difficulty is experienced in placing the shoot on the wire without forming an unsightly bend. which also tends to restrict the flow of sap.

During the fourth winter pruning, shoots arising from the older portion of the arm are selected, and if the fruiting wood is to be spur pruned, shoots spaced 6 to 9 inches apart, preferably on opposite sides of the arm are selected and pruned to two-bud spurs. All other shoots are removed with the exception of the one required for extension of the arm. The extension is carried on by laying down the end cane on the wire and reducing it to the required length with the last bud underneath. The arm is extended from year to year until the Spurs are built next vine is reached. in from time to time as the arm is extended. The treatment of the fruiting wood is usually to cut away the top growth from the spur and retain the bottom growth which is reduced to two buds. This method prevents the unnecessary extension of the secondary arms.

Where the rod and spur system is used, the top growth is used for the rod and the bottom growth for the spur. Each winter the spent rod is cut away and the top growth from the spur is used to replace it.

#### The Espalier.

The espalier system is one in which the trellised vine is framed with a pair of arms, one on either side of the stem.

During the second summer the shoot retained for the formation of the stem is trained up until it is a few inches above the wire on which the arms are to be framed; the shoot is then cut off at the wire. Growths arise from the buds along the shoot; all but the two top ones are cut back in order to force the supply of sap into them. These shoots will form the first portion of the main arms.

The method of framing the espalier is the same as in the case of the cordon, with the exception that two arms, one on either side of the stem, instead of one arm are built in.

The espalier framed with two long arms is known as the Thormery Espalier. The sultana vine is often framed with two or four short arms of 4 to 6 inches in length, each of which usually carries one spur and one rod.

#### The Value of the Water Shoot.

The water shoot can be used for spurs on varieties that are rod and spur pruned, as the rod is retained for carrying the season's crop, while the spur is left to produce wood for the following season's rod and spur. The growth that arises from a water shoot spur is good fruit bearing wood the next season, as it arises directly from two-year-old wood.

The water shoot can be used for reducing the length of extended secondary arms on a spur-pruned vine, provided it is growing in a suitable situation. The water shoot is reduced to a one bud spur, while the fruiting wood at the top of the secondary arm is pruned to two buds to carry the next season's crop. The following winter the shoot arising from the spur is fruit bearing wood and is pruned accordingly, and the secondary arm is reduced to the position where this spur is situated.

#### Keep On Buying War Savings Certificates.

## INSECT PESTS.

Notes contributed by the Entomological branch.





### Pests of Tomatoes.

AMONG the most important pests of tomatoes are the tomato caterpillar (Heliothis armigera), various species of cutworms (Noctuidae), the vegetable weevil (Listroderes obliquus), aphids (Macrosiphum solanifolii), thrips (Thrups spp.), the vegetable bug (Nezara viridula), white flies (Trialeurodes vaporariorum); and in some seasons, in certain districts, the Rutherglen bug (Nysius vinitor). the stem caterpillar (Gnorimoschema plaesiosema), and leaf-hoppers (Jassidae) may cause considerable damage. The metallic-green tomato fly (Lonchaea rugosifrons) is of minor importance.

#### The Tomato Caterpillar.

The eggs are laid by the moth on or near the blossoms, and the caterpillar makes an entry while the fruit is still very small—fre quently while the blossom is still adhering to the fruit. Before entering a fruit, however, the caterpillar may feed upon portions of blossoms and prevent the setting of fruit, or it may feed upon the tender parts of the foliage An infested young fruit may be destroyed forthwith, or it may continue

to grow with the caterpillar developing inside. When the fruit is reaching maturity and the caterpillar within is about fullyfed, the caterpillar may cat its way out and then attack and ruin other sound fruit on the plant. The fully-fed caterpillar measures about 1½ in. in length.

#### Control.

In areas where the tomato caterpillar occurs regularly each year, routine treatment for its control should begin when the first blossoms commence to set, and from then on, for a period of six to eight weeks, there should be no let-up in the operations. Best results, in most cases, will be obtained by alternately spraying and dusting with lead arsenate until the plants are about warst-ligh, after which spraying should be

carried out.

The Tomsto Caterpillar.

[After Quaintance and Brues.

Early Crops.—For the Coff's Harbour and other early North Coast areas, spraying should be carried out at weekly intervals, using 3 lb. of lead arsenate powder to 40 gallons of water. Mid-way between the spray applications the crop should be dusted

with a mixture of lead arsenate powder I lb., kaolin I lb. (50 per cent. mixture). In spraying the whole plant should be covered, but when the applications of dust are made, only the tops of the plants, the blossom hand and young fruits need to be treated. When the plants become too tall for dusting, spraying should be carried out at least once a week, using 4 lb. of lead arsenate powder to 40 gallons of water.

Mid-season or summer crops, everywhere in New South Wales, are usually only lightly infested, but exceptional seasons occur in which the damage is very extensive

Late Crops.—In areas such as Somersby, Mangrove Mountain and Kulnura, on the Central Coast, a similar programme of spraying and dusting to that used for early crops should be adopted. The period when most severe infestation occurs in these areas is from mid-February to about the end of March. During this time the sprays should be 2 or 3 lb. of lead arsenate power to 40 gallons of water; and the dust a mixture of lead arsenate powder 1 lb., kaolin 2 lb. (33 per cent. mixture).

All tomatoes should be wiped or dipped upon picking, in order to remove arsenical residues. Information regarding dipping may be obtained on application to the Department.

#### Cutworms.

Cutworms are the larvae of several species of moths. They are usually dull-coloured caterpillars, which mostly feed at night and hide in the soil during the day. They measure about 112 inch in length when fully-fed.

Cutworms feed on a wide variety of weeds in addition to cultivated crops, and therefore any ground that has been cleared should be baited after an interval of several days, with a poison bait as a precautionary measure before planting out. To mato stems may be cut through at ground level when the plants are young, but when the stems are older and too tough, the cutworms may climb up the plants to feed on the foliage.

The recommended poison bait formula is:—

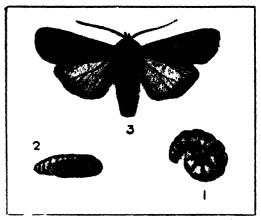
 Bran
 24 lb.

 Paris green
 1 lb.

 Salt
 8 oz.

 Water
 2½ gallons.

Instead of Paris green, white arsenic or arsenite of soda (9 oz.) may be substituted, but the bait is then much less attractive and effective. To prepare the bait the bran and Paris green (or white arsenic) should be thoroughly mixed while dry, and then made into a damp, crumbly mash with the water in which the salt has been dissolved. If arsenite of soda is used, it should be dissolved in the water before mixing with the bran.



1. -Cutworm (or larva). 2.-Pupa. 3.-Moth.

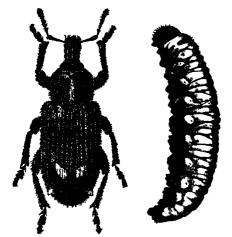
The bait should be broadcast over the area, at the rate of 50 lb. to the acre, before planting out, or in later infestations, spread along the rows of infested plants. The bait is best distributed late in the afternoon so as to remain fresh overnight. It should be remembered that the bait is poisonous and must be kept out of the reach of stock, and care should be taken in handling it.

#### The Vegetable Weevil.

Both the larvae and adults may attack the plants. The larvae, which measure about 1, inch in length when fully-fed, are legless grubs which vary in colour from pale-green to yellow. The grey-brown adult weevils, which measure about 1/3 inch in length, emerge from the soil about the end of August, and are most numerous during October and November. Both larvae and adults hide in the soil about the base of the plants during the day and feed at night.

#### Control.

Ground which has been cleared should be baited with the poison bait as recommended above for cutworms, before planting out. or else it may be baited with chopped leaves of Cape weed, marsh mallows or waste lettuce or turnip leaves, etc., which have been either sprayed or dusted with lead arsenate.



Adult and Larva of the Vegetable Weevil.

The formula for the spray is lead arsenate powder 4 oz., water 5 gallons, and for the dust a mixture of lead arsenate powder 1 lb, and kaolin or hydrated lime 4 lb.

#### Tomato Aphids.

The green aphids which attack tomatoes are mainly pests of spring and autumn crops and feed by sucking the sap. They are best controlled by spraying with nicotine sulphate in a weak (1:1:40) Bordeaux mixture at the rate of 16 fluid oz. of nicotine sulphate to 40 gallons of mixture (1 in 400). Bordeaux mixture increases the efficiency of the nicotine sulphate, and at this strength will not cause any spray injury.

Where the infestation is severe, two or possibly three applications at weekly intervals will be necessary. The undersurface of the leaves should be thoroughly sprayed

#### Thrips.

The thrips of economic importance are small, elongate insects, which, in their adult stage, possess two pairs of narrow, delicate wings. They feed by means of rasping or scraping away the surface of the plant cells, and then, by means of a short tube, sucking up the sap which exides. They infest various weeds, etc., as well as cultivated plants. Thrips, after feeding on bronze wilt

infected plants, may migrate to healthy tomatoes and by feeding convey the infection to them.

#### Control.

The control recommended is to spray with a foliage poison bait which consists of tartar emetic I oz., sugar 4 oz., water 4 gallons The plants should be sprayed at weekly intervals commencing from the time the seedlings are an inch high until picking begins. It is important that the bait be applied in the form of a very fine mist, and not in the way ordinary sprays are applied. For seed-beds a hand atomizer may be used, and for economy in the field, ordinary spray equipment should be modified to give a fine mist-like spray, A thorough coverage of the whole of the upper surface of the foliage should be obtained, and if other



The Plague Theips.

sprays are being used, apply the tartar emetic last, after the other sprays have dried. If rain falls another application of bait will be necessary.

The following poison bait has shown promising results in experiments and may be used instead if tartar emetic is unavailable: Paris green 1 oz., sugar 6 oz., water 6 gallons. This spray should be agitated during spraying, and care should be taken to ensure that it is only applied in the form of a very fine mist as injury to the plants may occur.

#### The Tomato Mite.

This mite is one of the most serious pests of tomatoes during the summer and early autumn and treatment to prevent infestation is necessary in all parts of New South Wales. Early crops are less subject to infestation.

The mites are extremely small and can only be seen with the aid of a lens. They feed on the surface tissues of the stems, the fruit and the leaves, reducing the vigour of the plant and causing shedding of blossoms and stunting of the fruit. The first sign of



Tomato Plant Infested With Tomato Mite.
Showing drooping and withering of leaves.

infestation is a silvering of the foliage and a drooping and curling of the lower leaves. The stems and leaf-stalks have a smooth appearance, and later the stems and undersurface of the leaves become brown and the skin of the fruit may become roughened and corky-looking. Eventually the leaves may wither and die.

#### Control.

Early crops should be treated when the first fruit commences to ripen, and again about a month later. Treatment of midscason and late crops should be a routine practice. Summer crops should be treated in the seed-bed, again about four weeks after transplanting and subsequently at three to four-weekly intervals. Autumn crops planted out in January and February should be treated in the seed-bed and again after transplanting about a week before routine Bordeaux applications commence.

Tomato mites can be controlled by dusting with fine sulphur mixed with an equal quantity of hydrated lime, or by spraying with lime sulphur (1 in 100) 1 pint to 12½ gallons of water. The spray should be applied to the stems and undersurfaces of the leaves. The dust need only be applied in a general manner to the whole plant, and it to be preferred to the spray. It has the disadvantage, however, that it may burn tender seedlings in hot weather and may cause fruit scald on plants which are heavily infested with mites.

Where spraying with lime-sulphui follows treatment with Bordeaux mixture or other copper fungicide, some injury to the plants may result, but dusting with sulphur will not affect plants which have recently been treated with these fungicides

For mite control on tomatoes which are receiving regular treatment with Bordeaux, either wettable sulphur (3 lb. to 40 gallons) or colloidal sulphur (1 lb. to 40 gallons) may be added to the Bordeaux sprays. Wettable sulphur requires frequent agritation to prevent it from settling on the bottom of the spray container.

#### Green Vegetable Bug.

The young bugs, at first, are of a general bright orange colour with darker markings, and later, in their different immature stages, are marked with red, green, yellow and orange. Often they are not recognised by growers as the immature forms of this pest. The adult bug is a shield-shaped misect, about 5% inch in length, and of a uniform green colour, but during the colder months they may become dull brown or purplish. Both immature and adult bugs feed by sucking the sap, and may attack all parts of the plants. The most noticeable

damage is caused to the young shoots and delicate portions of the foliage; when tomato fruits are attacked they become mottled and discoloured.

The bugs overwinter as adults, and commence to lay eggs about the middle of September. They increase in numbers and become most abundant during February and March.

#### Control.

This pest is now largely controlled by the introduced wasp parasite, Microphanurus basalis, the larvae of which develop within the eggs of the bug

No insecticide yet available will readily destroy the adults on the plants. The immature bugs may be dusted with pyrethrum powder mixed just before use with an equal quantity of 2<sup>1</sup>2 per cent income dust

Collecting the bugs and their egg clusters carly in the season will greatly reduce the amount of infestation later. Clean cultivation is an important factor in control; and as the bugs congregate amongst the leaves of old plants which have ceased to bear, the destruction of these, together with the bugs thereon, helps to prevent increase and temfestation.

#### White-Flies.

The adults are very small, mealy-white, delicate tour-winged insects which fly readily when disturbed, but quickly settle again. They are common in coastal and some inland districts, and infest both glass house and field crops of tomatoes. They are also found on other crops and weeds. Both larvae and adults feed by sucking the sap

These insects are usually controlled by the introduced wasp parasite, *I nearsia formosa* which lays its eggs in the larvae of the white flies

Field infestations may be controlled by spraying with a mootine sulphate and soap solution, the quantities being. Nicotine sulphur 1 fluid oz, soap 2 oz, water 4 gallons A 212 per cent, nicotine dust may also be used. A second application, a fortinght after the first in summer, or three weeks after in the cooler month, will be necessary.

#### The Stem Caterpillar.

These caterpillars, which may be either greyish-green or pink, measure up to ½ inch in length. They burrow into the stems of the plants from 6 to 8 inches above ground to an inch or so below. The plants wilt and die, usually when about 2 feet in height and the second or third truss of first has set.



Adult White-Flies on Tomato Leaves,

These borers have been recorded from many localities in the Central Coast from Sydney to Newcastle, but they are not considered to be serious pests and outbreaks are infrequent. Light infestations occur in most late autumn crops, and severe infestations are usually confined to a few early spring crops in the Parramatta district.

This pest may be controlled with the lead arsenate dusts or sprays recommended earlier for control of the tomato caterpillar. Applications should be given every ten days for a month to six weeks after transplant-

# Tigures

## THAT TELL A WAR STORY

Today no new G.M.H. motor vehicles are being built for civilian use. The G.M.H. factories, their man-power



and machines have swung over to essential war production. Figures of car sales have vanished — figures of weapon production are mounting

\*

Included in the vital statistics of an organisation are its turnover and its profit and loss account. Illustration of

1039 1941

the company's unselfish support for the war effort can be found in a comparison of these figures for peace-time 1939 and for 1941. In 1939 turnover was £8,962,000, in 1941 it was £8,525,000 but the 1941 profit was only one-third of peace-time 1939.

+

Purchases by G.M.H. from Australian sources during 1941 totalled £4,998,000. During this period, too, the



employees of G.M.H. increased from 5,865 to 9,300; last year's payroll was £2,282,000. These men and women at G.M.H. factories have done splendid work. In an incredibly short time, they have learned entirely new and intricate jobs.

4

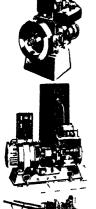
The enthusiastic co-operation of these people who actually are G.M.H., and of many hundreds of independent manufacturers who have collaborated with G.M.H., has produced an ever-increasing flow of war materials including aeroplone assemblies and parts, guns, boats, shells, bombs, and many types of Army vehicles.

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A G

ing. The remains of late autumn crops should be burnt as soon as picking ceases, as this will prevent many moths from emerging and will reduce spring infestations.



Stems Sectioned to Show Borer Damage.

#### Rutherglen Bug.

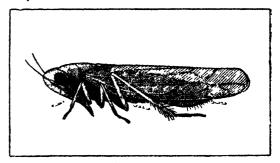
In some seasons Rutherglen bugs may occur in large numbers and become pests of tomatoes during mid-summer. The adult bugs, which measure about 1/5th inch in

length, are narrow-bodied and greyishyellow in colour. Both the immature and adult stages of the bugs feed by sucking the sap, and although the main damage is usually caused to the fruit, the terminal shoots of the plants may also be injured. The infestation generally lasts for about a month or less.

These insects may be controlled by dusting with pyrethrum powder or with pyrethrum powder mixed, just before use, with an equal quantity of 2½ per cent. nicotine dust. The dust should be applied with a dust gun during the heat of the day.

#### Leaf-hoppers.

Leaf-hoppers are small, yellowish-green insects which feed by sucking the sap. They are seldom serious pests of tomatoes. The treatment recommended for aphids will control them, and the copper sprays normally used on tomatoes check these insects.



The Adult of a Leaf-hopper or Jassid.

#### Metallic Green Fly.

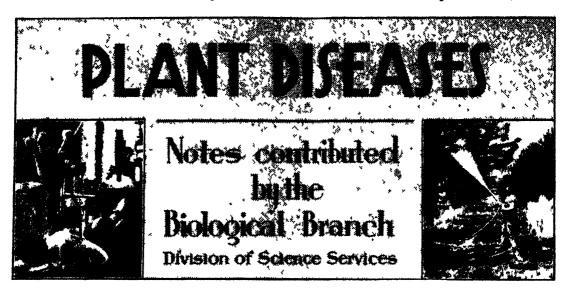
This fly, which measures about 1/6th inch in length, lays its eggs in fruits, the skin of which has been damaged by other insects or has been broken; and as the maggots only breed in such fruits, it is of little economic importance.

#### Guernseys.

(Continued from page 355.)

exists and which possesses something of the same characteristics, at least as to colour, as the Island breed. The same authority gives us the other side of the ancestry of the Guernsey—a breed of Normandy, the Isigny, well known for its characteristic butter production. Colour is lent to this

theory by the brindle markings which from time to time appear in the Guernsey, for the Isigny of Normandy was brindled. It is also considered probable that the Isigny may have been originally imported to Guernsey Island for draught purposes, being a much larger animal than the Froment du Leon.

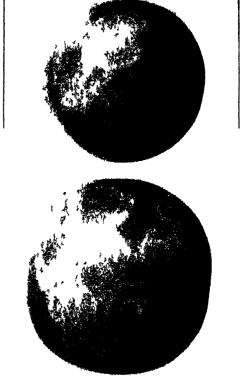


### Tomato Diseases and How to Control Them.

SUCCESS in tomato growing depends largely on the avoidance of losses from diseases. The location of the crop—whether in coastal or inland districts with their different climates—and its distance from closely populated areas, determine which of the many diseases will demand closest attention. Then the time of cropping—early, mid-season or late—and the type of season, whether wet or dry, will have their influence. It thus becomes necessary for the tomato grower to acquaint himself early with the troubles he is likely to encounter in his district, and to decide on appropriate control measures, modifying operations to suit the season.

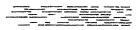
#### Bronze or Spotted Wilt.

In the outdoor crop the most serious disease in many districts is bronze or spotted wilt, a virus disease which is conveyed from diseased to healthy plants by means of small, flying insects, viz thrips. Losses from bronze wilt are particularly heavy in spring and autumn crops grown near cities and large towns. This is because many garden and ornamental plants can harbour the bronze wilt virus, and thrips which migrate as winged adults from these plants to young succulent tomatoes, carry the virus with them. Many weeds, too, particularly in old



Bronze or Spotted Wilt Concentric blotches disfigure fruit which has developed





Bronze or Spotted Wilt

On the younger leaves and growth ceases





Wilting of Plants is a Sign of Fusarsum Verticilisum or Bacterial Wilt When the stems are cut lengthwase darkened streaks are seen in the water conducting tissue

cultivated areas harbour the virus and the migration of virus-carrying thrips which occurs when the weeds commence to 'hay off may lead to bad outbreaks of the disease in the neighbouring tomato crops

Lesses from bronze wilt can be reduced by spraying from the seed-bed stage on wards with a bait consisting of tartar emetic and sugar

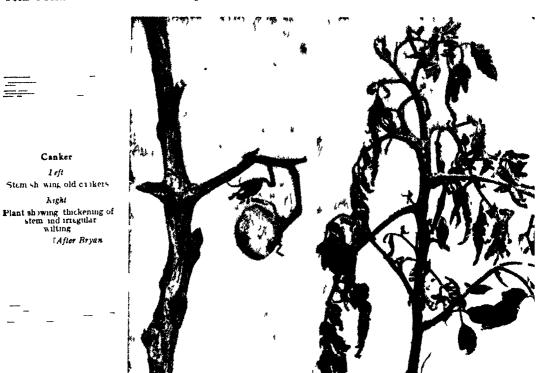
#### Wilts Caused by Fungi and Bacteria.

In addition to bronze or spotted wilt, there are a number of wilts caused by fungi and bacteria. Fusarium wilt is the best known of these and the "wilt resistant' varieties have reference to this disease. There is also Verticillium wilt called after the fungus which invades and block the water conducting channels of the plants, and bacterial wilt, in which the water conducting system is invaded by bacteria instead of a fungus.

Canker 1 eft

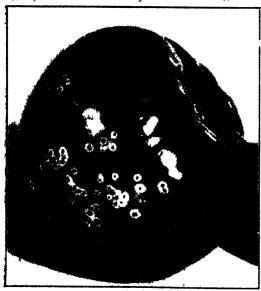
Light

wilting [After Bryan



#### Canker.

In recent years mother bacterial disease, canker, has come into prominence. In this case, the bacteria may break through the



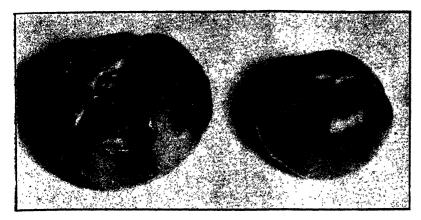
Canker "Bird's Live ' spots are sometimes present on fruit

stem and leaf stalks causing splits or cankers. Canker is recognised not so much by its wilting effect on plants, as by its stunting action and sometimes, a striking 'bird-eve' spotting of the fruit may also be present

Losses from fungous and bacterial wilt diseases as well as canker may be avoided by using care in the selection of seed care in the introduction of new tomato seed to the farm and by crop rotation

#### Blights and Leaf-spots.

In wet periods fungous diseases of the foliage can become highly destructive to the tomato crop Late or Irish blight is likely to be the most troublesome in coastal districts, but Septona leaf-spot and Alternaria leaf-spot (or early blight) can cause much loss of leaves, and in the case of the latter, fruit losses as well These diseases can be controlled by spraying with Bordeaux mixture, in spring and summer use of this spray 15 advisable, and it is a waste of time attempting to grow a late autumn crop in coastal districts unless Bordeaux is used. Its use with glasshouse crops is also advisable in wet years to prevent outbreaks of



Late or Irish Blight.
Fruit shows green, water-soaked spots or mouldy patches.

blight, since the spray applied for leaf mould control (Shirlan A. G.) does not alone control blight.



Early Blight or Alternaria Leaf-spot. Spots are concentrically zoned or target-like.

#### Root Knot and Blossom-end Rot.

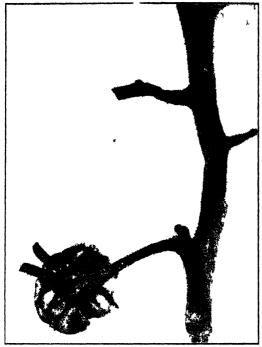
Root knot, characterised by lumps or galls on the roots, is caused by nematodes—minute worms invisible to the naked eye. The disease can become serious enough to cause the abandonment of sandy soils in which tomatoes have been grown year after year without rotation.

The greatest care must be exercised to prevent the introduction of this disease on infested seedlings. In glasshouse culture it is payable to use steam to rid infested soil of nematodes.

Blossom-end Rot is caused by water deficiency during the development of the fruit, and can occur even in well managed crops during periods of hot dry winds. Flooding of the soil, by stifling root action, can also lead to insufficient water reaching the fruit.

#### Further Virus Diseases.

In addition to bronze wilt there are other virus diseases which can lessen the profit from a tomato crop. Big bud, which takes the form of proliferated shoots and malformed flower trusses, occurs when viruscarrying insects migrate to the crop from other infected plants; it is common in inland districts but in some years is also of importance on the coast. Mosaic usually originates from the hands of smokers, the virus being present in most brands of tobacco. Fern leaf is caused by inoculation of tomato plants by aphids with cucumber mosaic virus, which is relatively common in other crop plants and weeds.

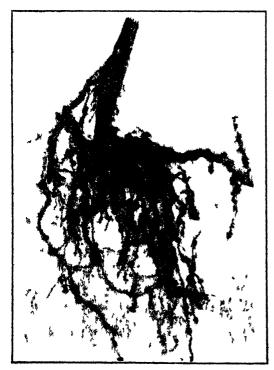


Late or Irish Blight Stem on the stage

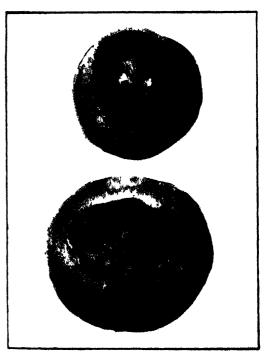


Septona Leaf Spot

The spots are smaller than those caused by Alternaria
and have minute dots in the certification.



Root Knot



Blossom-end Rot

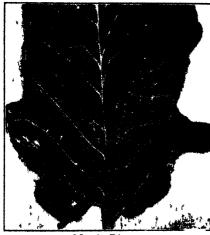
#### Leaf Mould and Streak.

Growers of glasshouse tomatoes may encounter any of the above diseases, but a fungous disease, leaf mould or mildew, which is rarely troublesome in the field, calls for most attention. Fusarium and



Big-bud (Rosette) Disease.

Verticillium wilts under glasshouse conditions are usually attended to by steam sterilisation of the soil each year, or as often as losses warrant it. In certain instances complete failure of glasshouse crops has been caused by streak, a virus disease, related to



Mosaic Disease

tobacco mosaic. It is suspected that this disease, like tobacco mossaic, is introduced and spread on the fingers of smokers, and care in washing the hands with soap and water after smoking should be insisted on.

## Control Measures. Seed Disinfection.

Tomato seed should always be disinfected before planting. Dust the seed with copper oxychloride, or a proprietary mercury dust, by shaking the dust and seed together in a hdded container. If the seed is of doubtful origin it should be soaked in 0.6 per cent. solution of acetic acid (I fl oz in a gallon) for twenty-four hours, to guard against the intioduction of canker disease. After drying thoroughly, it may be treated by dusting as above to reduce possible losses from damping-off Copper oxychloride should be used at the rate of one level teaspoonful per pound of seed, and the mercury dusts at the rate of a quarter or half level teaspoonful per pound. Growers are advised to save their own seed each year from selected



Fernicaf Disease.

healthy plants, and to be reluctant about introducing new loss of seed unless there is good reason

#### Crop Rotation.

The danger from soil-inhabiting parasites is at a minimum on virgin land, and it is advisable not to use the same land year after year, either for the seed-bed or the crop. The seed-bed should be well drained, and in areas subject to heavy rains should be of the covered type, especially when the early spring crop is being grown. The varieties

Break o' Day, Marglobe, Pritchard and Marhio are resistant to Fusarium wilt, and are well suited to old land if such must be planted.

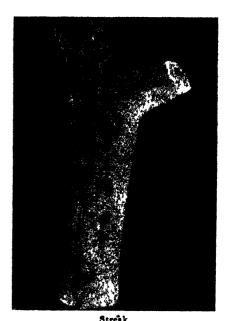
Fungicides.

The application of fungicides is similar to paying insurance. It is, however, a preventive of disease and not a cure. In coastal and tableland districts, and in inland districts when the season is wet, plants in the seed-bed should receive a spray of 1-1-20 Bordeaux mixture soon after the first true leaves appear. Two or three applications at intervals of ten days are advisable with early planted crops.



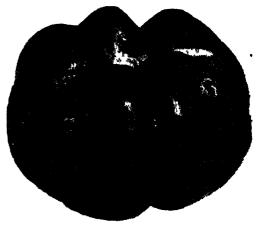
Leaf Mould or "Mildew" - the Worst Glasshouse Tomato Disease. The mould occurs on the underside of the leaves.

After recovery following transplanting, early crops on the coast and tablelands should be sprayed with 1-1-20 Bordeaux mixture. Regular spraying with 1-1-20 Bordeaux mixture at intervals of ten days or a fortnight should be a routine procedure with coastal crops in the spring and autumn months, and also in the summer when wet



Sunken streaks and spots caused by the streak virus on tomato stem

weather prevails. With certain coastal crops it is advisable to combine arsenate of lead (3 lb to 40 gallons) with the Bordeaux mixture to control the tomato caterpillar, and to spray the whole plant at least once a week. When this is done the strength of the Bordeaux mixture should be reduced to 1-1-40 to avoid excess spray deposit. Nicotine sulphate, too, may be added (16 oz. to 40 gallons) to 1-1-40 Bordeaux mixture, with or without arsenate of lead, to control aphids which may be troublesome if dry weather prevails in the spring and autumn. Bordeaux mixture increases the activity of



Sunken Spots Caused by the Streak Virus.

nicotine. Colloidal sulphur or wettable sulphur also may be added to Bordeaux mixture to control mites.

For inland districts and later planted crops on the tablelands, field application of Bordeaux mixture is usually unnecessary except in wet seasons. Here the most serious causes of loss are mite injury and the virus disease big bud, and bronze wilt if the crop is located near a town. Mite may be controlled by spraying with 1-100 lime-sulphur, or dusting with sulphur every three weeks from the time the first blossoms appear. If Bordeaux mixture is being used, colloidal sulphur (I lb. in 40 gallons) may be combined with it for control of mites, or sulphur dust may be used on top of the Bordeaux. Limesulphur should not be combined with Bordeaux mixture.

In the neighbourhood of cities and towns the main fight will be against bronze wilt.

From the early seed-bed stage onwards a bait for the virus-carrying thrips consisting of tartar emetic I oz., sugar 4 oz. and water 4 gallons, should be applied, as a fine mist, each week. Application of other sprays may be necessary, too, and the tartar emetic bait should be applied after they have dried. Renew the bait after rain, since it is easily washed off the plant. To prepare small quantities of the spray, dissolve 1 oz. of tartar emetic in I quart of water and bottle. Take 2 fluid oz. (1/4 cup) of the bottled solution, add 11/2 pints of water and stir in one heaped teaspoonful of sugar. Prepare fresh dilution each time required. A fly sprayer is satisfactory for spraying seedbeds, and for economy in the field, ordinary spray equipment should be modified by fitting a nozzle with a very small aperture. A thorough coverage of the whole of the upper surface of the plants should be the objective at each application.

## Selected Citrus Buds. The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1941 budding season, trees from which should be available for planting during the 1942 season:—

				-					
	Washing- ton Navel.	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lisbon Lemon.	Emperor Mandarin.	Total		
Adamson, T, Ermington	4,000	4,000		2,000	***		10,000		
Cambourn, H, Gosford	3,500	5,000		3,000	•••		11,500		
Catt, F. D., Carlingford	3,000	3,000		3,000	1,000		10,000		
Eyles, A. T., Rydalmere	5,000	5,000	1,000	2,000	•••		13,000		
Ferguson, E. H., Wyong	1,000	1,500		500			3,000		
Ferguson, F., & Son, Hurstville	2,500	2,500		,	•••	l l	5,000		
McKee, Geo., Rydalmere Rosen, L. P., & Son, Carling-	1,500	1,000		1,000	1,000		4,500		
ford	10,000	15,000	2,000	5,000	1,000	800	33,800		
Smith, W., Rydalmere Spurway, F. E., & Son,		•••		2,000	•••		2,000		
Ermington	3,500	5,000	750	500	250		10,000		
Swane Bros., Ermington	5,000	2,000	1,000	1,000	1,000	800	10,800		
	39,000	44,000	4,750	20,000	4,250	1,600	113,600		

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## Beekeeping Hints

W. A. GOODACRE, Senior Apiary Instructor.

#### Early Season Inspections.

WHEN the bees commence active field-work in the early spring, the bee-farmer will need to concentrate on giving his colonies a thorough overhaul. Not one hive should be overlooked on this occasion, and the matters to be attended to may be set out briefly as follows—

(a) Ensure that there is a queen in each hive, and that she is provided with good worker brood combs for extension of brood-rearing. The presence of eggs and larvæ in the brood nest indicates that a queen is present.

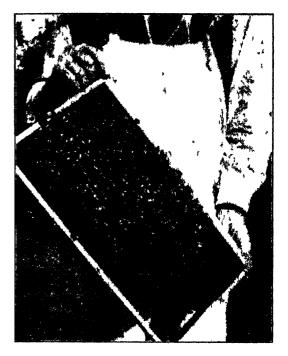
(b) Ensure that the food supply is ample to induce progressive work in building up a brood nest. Where an additional quantity is required for this purpose, a comb or two of honey may be procured from a well-provisioned hive, or artificial feeding may be applied

(c) Give the hive a spring cleaning by cutting out the burr-comb attached to frames and other hive parts, and removing any accumulation of wax scraps and other debris that may have collected on the floor

(d) Observe carefully whether any symptom of bee-disease is present, a clean start is essential to success

In order t, avoid imposing any undue strain on the colonies in the maintenance of incubation temperature in their brood-rearing work, the bee-farmer should be sure to select mild, sunny days, when the bees are active in their field work, for early-season inspection and readjustment work. A few minutes will suffice for the complete examination of a hive when all is m order, but the job should not be rushed, for in most cases some attention, helpful to the future welfare of the colony, will be found necessary. Careful observation and study of each colony is recommended.

Some of the general problems which the bee-farmer may have to face during the



carly season overhaul are discussed in the following paragraphs

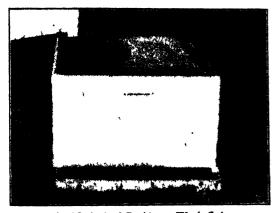
#### The Queenless Colony.

It is not unusual to find a colony or two in a queenless condition. Robber bees are likely to invade these hives, and cause a serious disturbance in the apiary at a time when it is particularly desired that all should be kept as calm and contented as possible Raids by robber bees may also cause the introduction and spread of brood disease in the apiary. Immediately a queenless colony 15 discovered, it should be given attention, and the best plan is to unite it with a normal one of medium strength. The beginner is always very much concerned about losing a colony in this way, but it should be possible, later on when conditions are more tavourable for queen-raising, to form a nucleus colony or two and thus make up the loss.

The only satisfactory way to keep a queenless colony going is to supply it with brood and bees from other hives. Such a plan may be adopted when stocks become populous enough to provide assistance without undue interference with the internal economy and progress of the other colonies. During the early part of the season, however, bees rarely have sufficient brood to fulfil such requirements.

#### Weak Colonies Need Careful Nursing.

Weakly-populated colonics, with a queen in company, need careful nursing to ensure their survival through the difficult early part of the season. Combs occupied by bees should be placed on the sunny side of the hive, and then packed in snugly with paper, bagging, or any such material as will assist



Handy Method of Packing a Weak Colony

in maintaining the warmth of the cluster. It may not be very long before the more progressive colonies become well established and in a position to spare a comb of brood and bees for placing with the weaker stocks. The comb containing bees and brood may be placed directly in the brood nest of the small colony, and it should contain plenty of young adult bees and some baby bees emerging from the brood. The latter proves that a fair portion of the brood is mature and will not give rise to an incubation problem. Following this manipulation, and to allow the bees to protect their home against interference from robbers until they settle down, the hive entrance should be contracted to about I inch in length by 3/8 inch

Some bee-farmers operating in a larger way, may prefer to unite weak colonies by

placing several of them in one hive: the matter of finding time to nurse them through separately may have to be considered. The colonies and queen bees lost in the process may be replaced later on when ample facilities are available for this purpose. The average bee-farmer, however, may not be so well placed, and the loss, particularly of the queen bees, occasioned in uniting work, is a matter of considerable concern to him. He must, therefore, hold the weak stocks by carefully nursing them until assistance from more forward hives may be given.

#### Drone-laying Queens.

During the first inspection it may be found that, in odd instances, a drone-laying queen is present. The colony may have superseded its queen late in autumn when the weather was unfavourable and drones scarce, and the new queen did not succeed in making a successful mating flight. Such a queen will obviously show out as a drone-layer. An old queen that has expended her store of fertilising material may also become a drone-layer. A drone-laying queen should be destroyed, and the colony crowded on to a new frames and transferred to a super on a populous hive.

As in the case of the queenless live, if the discovery is made later on in the season, the colony can be assisted with brood and bees, and supplied with a queen to provide a fresh start. The presence of a dronelaying queen may be determined by the appearance of her sealed brood. The worker-cells, which she invariably employs, do not provide sufficient accommodation, and the worker-bees, in an endeavour to rectify this abnormality, construct bullet-shaped cappings over the cells. The cappings over normal worker-brood are flat.

#### The Importance of Good Brood Combs.

The early part of the season, when a minimum number of combs are occupied for brood rearing, is an opportune time for the bee-farmer to cull combs from amongst those not in use for this essential work. In the average apiary, inspection will reveal the presence of brood combs in which the efforts of the queen are reduced to about 75 per cent. of her capacity to produce worker-bees. There are too many patches of drone comb, or maybe distorted sections of worker-cells,

which interfere with her attempts to make the best of her egg-laying service; upon such service depends the ability of the bees to build up a maximum strength for honeyproduction during the ensuing season.

## The Wartime Demand for Honey and Beeswax.

DURING the last war and post-war periods the demand for honey and beeswax became so great that both local and overseas requirements could not be fully supplied. Since then the bee-farming industry in Australia has been considerably extended, and as a result of developments in migratory work be made to increase the 1942 honey harvest by 50 per cent. over 1941's 206,591,000 lb. Instead of exporting honey to Europe, the U.S. is now importing millions of pounds from Latin America.

"Honcy was listed among the fourteen essential foods which may be packed in tin cans (5 lb. size and bigger) in unlimited quantities.

"Beeswax needs of the Army and Navy running into thousands of pounds yearly have been doubled (so has the price). Beeswax is smeared as waterproofing over shells, airplane surfaces, ropes, canvas gaskets, etc. To up war production, apiarists will have to let their bees build more combs (instead of having them refill combs from which the honey has been centrifugally extracted).





and improved knowledge of the honey flora, the average annual production per hive in commercial apiaries has also been increased. In spite of these developments, however, we find enquity exceeding production. The present unfortunate wartime conditions have revealed the true economic importance of the bee-farming industry.

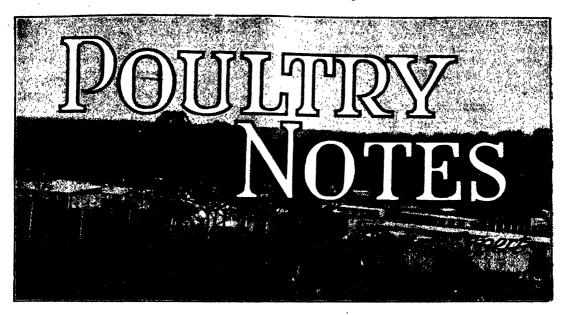
It is of considerable interest to learn something about conditions covering the industry at this time in other countries. The United States of America is doubtless the largest honey-producing country in the world, and the position there is well defined in the following extract from the American magazine Time:—

"The Department of Agriculture in U.S.A. announced that every effort would

This will be costly; bees must cat 12 to 15 lb of their honey to secrete 1 lb. of wax."

## AN EDUCATIONAL SERVICE ON A PERMANENT BASIS.

WITH all our modern ideas for the distribution of knowledge, there is nothing to compare with the printed word. It is by this means that we are enabled to give the benefit of our experience to the greatest number of people, and retain a permanent record of the experience for those who follow on. These records are always available for study for the purpose of improvement and keeping up with the times. Some of the early history of bee-keeping was carved in stone, the press of the ancients, and is still available.



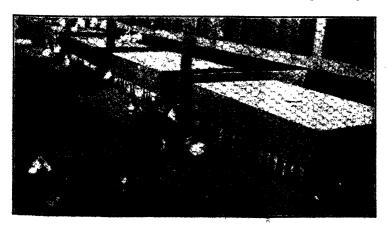
## The Chicken Rearing Season.

ON most farms the chicken season is now in full swing and the most important consideration is to ensure that the chickens are given the best of conditions in order to maintain maximum development and robust health, as future production is greatly influenced by the development attained in the early stages of growth.

During the brooding stage much can happen to retard development, and while it is not proposed to detail all the probable causes of trouble, it might be helpful to many to outline a few important factors in the management of chickens while in the brooders. First comes warmth; unless sufficient heat is provided to keep the chickens from packing together they will not thrive as they should, and in many cases mortality will result. Other considera-

tions are to avoid overtaxing the capacity of the brooders, allow ample fresh air, attend strictly to sanitation, and feed a suitable ration in which is included milk or milk products and green feed.

Contrary to advice given by some writers on chicken nutrition, it is not necessary to feed a protein-rich ration to chickens. There is overwhelming evidence that the simple ration advocated by the Department and adopted by many commercial poultry





farmers gives results equal to any concentrated and costly rations. Particulars in connection with the recommended ration are contained in a leaflet which will be forwarded on application to the Department, Box 36A, G.P.O., Sydney.

#### Second Stage of Rearing.

After passing through the brooders successfully, thousands of chickens are ruined by unsatisfactory conditions for handling them during the few weeks following and before they have learned to roost.

The practice of transferring the chickens from heated brooders at three weeks of age and putting them into cold brooders is farmers could compare the development of chickens raised under this system with that of others kept in suitable heated brooders they would realise the advantages of the latter.

Assuming that the safe practice of keeping the chickens in the brooder for six weeks is followed, the aim should be to induce them to perch as soon as possible and thus prevent the huddling together which occurs if no suitable slatted ramp is provided for teaching them to roost. Such a device is used with success at Hawkesbury Agricultural College, Richmond, and at the Government Poultry Farm, Seven Hills, and is





one which is being extensively adopted, and in many cases is detrimental to the health and development of the chickens. In some instances where good equipment is provided for this system it is true that reasonably good results are obtained, but, unfortunately, many makeshift appliances are used with disastrous consequences. If poultry illustrated in a leaflet on "Housing Poultry" issued by the Department.

If proper facilities are provided for the second stage of rearing there should be no mortality through crowding. If losses are experienced the methods adopted should be overhauled to discover the cause and prevent further losses.

#### Female Labour on Poultry Farms.

Many inquiries have been received regarding labour for poultry farms, but it is found almost impossible to obtain suitable male labour, and while some poultry farmers have obtained female labour, there are many who do not know where to apply for women workers, or whether such are available.

In this connection it has been ascertained that the Women's Land Army organisation has, at most times, names of women on their books who are prepared to take up poultry farming work. Some of these have had a little experience but others none. However, there are many light duties on poultry farms which can be performed by women, especially during the chicken-rearing season, and where suitable accommodation is available there is no reason

why at least portion of the staff on poultry farms could not consist of female labour. In fact, the position has been reached when the industry must look to women for assistance if production is to be maintained.

Women who are employed through the Women's Land Army and who do not live on the farm have to be paid £3 or £3 12s. per week of forty-eight hours, according to whether they are experienced or not. In cases where accommodation and keep are provided, they receive £1 less per week.

Those who desire to secure labour through this organisation can obtain further particulars from Mrs. F. Lynch, Director, Women's Land Army, 34 Martin-place, Sydney, 'phone BW 7566 or BW 5012.

### Rotting in Eggs.\*

#### Cleaning the Main Cause.

FOR some time past considerable wastage due to bacterial rotting has occurred in many shipments of eggs exported from Australia to the United Kingdom. While the total wastage in any one season has not been heavy, the marketing in pre-war days of large consignments showing heavy wastage resulted in monetary losses far in excess of the value of the wasted eggs, because such consignment depressed the market and lowered the confidence of the buyers.

In order to find ways and means of greatly reducing this wastage the Egg Producers' Council, in co-operation with the Council for Scientific and Industrial Research, set up an investigation committee in 1938, and extensive experiments have been carried out in the five mainland States during the past four seasons. The cleaning of eggs was found to be one of the major causes of wastage resulting from bacterial attack. A considerable amount of experimental data has been collected, and the Investigation Committee has now issued this statement on the more important results

#### Design of the Experiments.

The experiments were so designed that the conditions obtaining during export overseas were closely copied. For example, all eggs used were of export quality and the period of cold storage was similar to the duration of refrigerated transport on overseas ships (six to nine weeks). The extent of the wastage was ascertained after holding the eggs for three weeks at ordinary temperatures after removal from cold store. thus imitating the normal period of marketing in Great Britain. All the usual methods of cleaning employed on farms, including several types of machines, were investigated, more than eighty experiments being carried out.

Throughout the experiments there were considerable differences in wastage between eggs gathered from different farms, and the question arose as to whether these differences were due to varying conditions of treatment or to qualities inherent in the eggs. It is now clear, however, that cleaning is the most important factor in determining the extent of rotting rather than such aspects of husbandry as the quality of the stock, feeding and housing.

#### Low Wastage in Uncleaned Eggs.

One striking fact emerging from the results was the relative freedom from bacterial rotting in eggs which had not been cleaned. The wastage was usually less than I per cent. and never exceeded 6 per cent., irrespective of whether the eggs were "clean from the nest" or soiled.

Many, but not all, methods of cleaning resulted in the rotting being increased considerably above the amounts occurring in the uncleaned "control" lots.

#### Effectiveness of "Hand" Cleaning.

Out of some fifty experiments testing what might be termed "hand" methods of cleaning, only two showed appreciable wastage due to bacterial rotting. The conclusion has, therefore, been reached that such cleaning methods for eggs subsequently to be stored are usually safe. By "hand" methods are meant those which involve the cleaning of each egg individually by the operator using cleaning cloths and water which may, or may not, contain small quantities of some detergent such as soap or washing soda. It should not be assumed, however, that "hand" methods will always give satisfactory results no matter how dirty the conditions may be. A reasonable degree of cleanliness is called for involving the use of a change of water and clean cloths at least after cleaning each 15 dozen eggs.

Producers at present using "hand" methods would be well advised to continue doing so, provided adequate labour is available, but they should exercise every reasonable hygienic precaution. Moreover, care must be taken not to use water appreciably colder than the eggs, such as may occur when the cleaning operation is carried out shortly after the eggs are gathered. A delay of up to twenty-four hours between gathering and cleaning will not increase

<sup>\*</sup>Statement issued by the Egg Producers' Council and the Council for Scientific and Industrial Research.

subsequent wastage, and any risk of cleaning eggs while they are still warm will be avoided. Increased wastage resulting from cleaning warm eggs in cold water is probably due to the suction of bacteria from the shells and water through the shell pores into the egg contents when the latter contract during cooling.

#### Serious Effects of Machine Cleaning.

Cleaning by certain types of machines as operated on the majority of farms almost invariably gave greatly increased wastage, often to the extent of 60 per cent. total rots, figures of 10 to 30 per cent. being usual. Bacteriological experiments showed that, for any given machine, the more bacteria left on the shells after cleaning the greater was the extent of wastage. In other words, the dirtier the machine the greater was the amount of subsequent rotting.

Experiments were conducted to see whether the losses could be eliminated by thorough cleansing of the machines. In one type widely used in the industry, this practice was, unfortunately, seldom successful, although some reduction in wastage could often be effected. Many machines are so constructed that thorough cleaning is not easy, but there is some evidence to suggest that very frequent cleansing, accompanied by immediate renewal of any worn fabric coming into contact with the eggs, will result in a considerably lower average wastage.

The very marked difference in the effects of "hand" and machine cleaning is difficult to account for, but possibly the machines are particularly effective in forcing bacteria through the shells.

The cleaning of eggs on the farms is so much part and parcel of the industry as it is organised to-day that it cannot easily be dispensed with, and, moreover, the use of machines for cleaning is also essential on most farms, particularly when labour is difficult to obtain. While much can be done on many farms to increase the number of "clean from the nest" eggs, such improvements are not easily effected. For instance, in a large-scale experiment in South Australia last year, the percentage of soiled eggs as gathered was carefully recorded for

two flocks of 500 White Leghorn and 500 Black Orpington (Australorp) pullets, which were housed under conditions at least equal to, if not better than, those obtaining on the majority of poultry farms. During the months July to October inclusive, 89 per cent. of the eggs from the White Leghorns and 64 per cent. from the Black Orpingtons were classed as soiled, when judged by export egg standards.

#### Methods for Reducing Wastage.

No fully effective remedial measures for the elimination of wastage caused by machine cleaning have yet been devised, but further experiments with certain promising methods are planned for the coming season. Producers can lessen the severity of the wastage, however, by taking certain precautions. For instance, care should be taken not to clean eggs which are not soiled, although separation of clean from soiled eggs may not be feasible where the percentage of "clean from the nest" eggs 15 Particular attention should be given to the cleanliness of the machines, which at least once a week should be thoroughly scrubbed with hot, soapy water, followed by swabbing with a suitable disinfectant, such as chloride of lime. Bacteria thrive and multiply in moist situations, and rotproducing bacteria on cleaning machines are no exception. Every opportunity should, therefore, be given for the machine to become thoroughly dry between periods of use. One point is to avoid, if possible, using the machine more frequently than once each day. Other procedures which will help to achieve the same result will be obvious to producers, and they will improve the service from their machines if they are adopted.

#### Summary of Important Points.

The important points concerning the cleaning of eggs may be summarised as follows:—

1. Producers using "hand" methods of cleaning are advised not to change over to machine cleaning, but reasonably hygienic precautions should be exercised in the operations, and care should be taken not to use water appreciably colder than the eggs.

(Continued on page 397.)



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- W. Angliss & Co (Aust.) Pty. Ltd.
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- Central Queensland Meat Export Co., Lakes Creek, Rockhampton.

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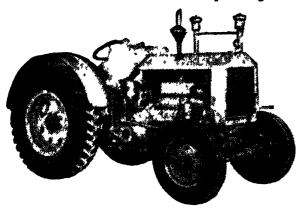


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#### PARAGRAPHS AND NOTICES.

#### Wheat Growing and Superphosphate.

SUPERPHOSPHATE will be in short supply for the sowing of the 1943 wheat crop and many farmers will be obliged to sow portion of their crop without superphosphate. The problem facing wheat growers is how best to achieve the greatest farm production not only in 1943, but during the whole of the war period. The rural manpower shortage and other limiting factors have already enforced a one-third reduction in wheat acreage, and the possible use to which this unsown wheat land may be put is an important consideration.

The superphosphate question centres around farming practices and acre yields, and a general statement as to the influence of fallowing and fertiliser may prove helpful, writes Mr. H. Bartlett, Semor Experimentalist. It must be borne in mind, however, that the percentage of influence will vary according to districts. In discussing farming practices, i.e., fallow versus stubble. the information available indicates that fallow-sown land will yield 45 per cent. greater than stubble-sown land should old and frequently cropped land be under consideration. The use of 50 lb. superphosphate per acre on fallow land will increase the yield by 30 per cent., and on stubble land by 15 per cent. High acre yields and smaller areas are more economical than low yields and larger areas in relation to manpower and tractor fuel requirements Therefore, best results will accrue from the sowing of only fallow land, and the application of the superphosphate which is available to that fallowed land.

#### New or Lay Land.

Rather astonishing results may be obtained from the sowing of new or lay land. Cowra Experiment Farm in 1941 a greater wheat yield per acre was secured from nonfertilised stubble sown plots, which were on the second cereal crop following eight years of grazing lucerne, than from plots in an adjoining area of old wheat land, fallowed and fertilised. Although this result must be considered as outstanding and perhaps unreliable because of lack of period results, practical observations have been numerous enough to confirm the substantial increase m acre yield which may be expected from new or lay land. The bringing of such land under cultivation, provided the first crop is for grazing or hay, will result in higher acre vields.

#### The "Left Out" Land.

The reduction in wheat acreage presents an unusual opportunity to establish lucerne growing areas upon old wheat lands which have been lowered in fertility, as all that is necessary is the addition of 2 lb. of lucerne seed to the seeding of the last wheat crop upon such lands as are to be left out. In addition to the improved grazing value of these lands there will be a considerable increase in wheat yields when they are again sown to wheat.

#### Vegetable Growers Should Not Neglect Pest Control.

Recent surveys of several important vegetable growing areas have shown that many growers have failed to take the necessary action to protect their crops from insect attack, despite the extensive publicity given to the control of insect pests of vegetables, points out Mr. T. McCarthy, Chief Entomologist of the Department. Many crops of cabbages, cauliflowers, carrots, parsnips and beetroot have been severely damaged and in other cases crops have been destroyed by

cutworms, cabbage grub, brown vegetable weevil and aphids. In some instances, no doubt, shortage of labour has prevented proper control measures from bong undertaken, but in many others growers have made no effort to control these pests.

The present season has been one of the worst on record for insect pests of vegetables, and inadequate preparation of the land and prolific weed growth have been important factors in building up large insect

populations on many farms. At the present time this weed growth is heavily infested with the larvae of the brown vegetable weevil, and unless immediate steps are taken to destroy this growth and keep the land clean very serious losses will occur in early spring crops of tomatoes and carrots. The danger to carrots is stressed particularly, as this crop is very susceptible to brown vegetable weevil, and as carrot seed is scarce every effort should be made to ensure that carrots are grown only in areas where clean cultivation has been practised for some time prior to sowing or where steps were taken to control this pest in the preceding crops.

If the presence of cutworms or weevils is suspected in an area to be sown with vegetables, a Paris green-bran bait should be scattered over the ground prior to sowing.

The cabbage grub has been very severe in crops where regular dustings have not

been carried out, but where the plants have been properly dusted with lead arsenate satisfactory control was obtained. was proved recently in the Maitland district in crops inspected by Mr. P. C. Hely, Entomologist. It is important to dust each plant thoroughly, as the eggs of the moth are often laid on the under-surfaces of the outer leaves, and the grubs may feed on these leaves for some time before moving towards the centre of the plant. Many growers believe that only the centre of the plant needs to be dusted, and very often the spreading collar on the end of the delivery tube is removed to restrict the dust to the central portion. This practice gives an excess of dust on the heart, while the outer leaves receive little or no dust, and in the present season it has failed to control the grubs satisfactorily.

#### 870 Gallons Milk From 47 Acres.

IN producing 870 gallons of milk a month from only forty-seven acres of ploughing and grassland a tiny farm below Sussex Downs has shown how British agriculture can adapt itself to the war effort.

Before the war, Mr. J. Cranfield ploughed only eight of the forty-seven acres of Woolton's Farm. East Chiltington, near Lewes. His eighteen head of livestock included only eight cows in milk and two working horses, and he had to buy each year 10 tons of feedingstuffs and 4 tons of fertilisers. For labour he had two men and a boy. By the winter of 1941 he had increased his cattle to thirty head, with eighteen milking cows, and his milk production had risen from 450 to 870 gallons monthly. At the same time purchases of feedingstuffs were reduced to 6 tons. All this without adding a single acre of land to the farm

The job was done by ploughing up another 16 acres, making the farm just half arable and half grass. Production amounted to 40 tons of silage (great reliance has been placed on the aftermath cut), 25 tons first-class hav, 75 tons mangolds. 60 tons kale, 15 tons of pea haulm, 100 sacks of peas and oats and 30 tons potatoes. Purchased concentrates could have been still further reduced had the peas not been sold for seed

In producing three to four times as much as in pre-war years from his little farm, 65-yearold Mr Cranfield has the assistance of a son under military age and another 23 years old, temporarily released from military service. Schoolboys were called in to help plant the three acres of potatoes and members of the Women's Land Army for lifting the potatoes and threshing the corn. A boy apprentice obtained under the Government's scheme is now in regular employment.

At the other end of the farming scale—as farms go in Britain—is Boughton Corner, Kent, where Mr D V. Fletcher has been farming 500 acres. Before the war only seventy of the 500 acres were under the plough; to-day only seventy acres are permanent pasture. The remainder grows arable crops or is down to temporary lay.

As the new grass from the lays came along the milking herd needed less and less concentrates. One 40-acre field produced roughly 330 gallons of milk to the acre in the six summer months of 1040 without using any concentrates

Another Kent farmer has maintained for the past three years an average of 1,000 gallons per cow almost entirely on home-grown foods. He has a herd of thirty-six head—ten more than in 1038—of officially recorded British Freisian cows. This farmer, Mr. C. E. Burnell, of Grantham Hall Farm, Lamberhurst, recommends this daily ration per cow: Maintenance, 14 lb meadow hay, 35-40 lb, kale or mangolds; production, 3 lb. crushed oats, 1 lb. linseed, 1 lb. ground beans.

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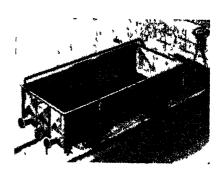
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# EMPHASIZING A DIRE NECESSITY.

DURING the financial year ended June 30, N S.W Railways carried a record number of people and a record tonnage of merchandise. Readers of the Agricultural Gazette are well aware what caused this unprecedently heavy traffic.

In the current year, demands upon rail way resources will, almost certainly, be still greater.

This means that the Department cannot afford to have any rolling stock idle (as is the immobilised truck illustrated above) even for what may seem to be an inconsequential time.

The man on the land knows from experience how his own operations would be hampered if trucks could not be provided to bring supplies to him or to take his produce to market.

The Nation's War effort is of paramount importance. It will be impeded if those who use trucks fail to load and unload them with the utmost dispatch.

#### DON'T TIE UP TRUCKS.

S. R. NICHOLAS,
Acting Secretary for Railways.

### Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry Date.	Owner and Address.	Number Tested.	Expir Date
	, 1	1942.			1943
M. Turnbull, "Pastime," Kayuga-road,			Emu Plains Prison Farm	100	20 Ma
luswellbrook	82	5 Aug.	Lunacy Department, Morisset Mental Hospital		25 ,,
River Land and Mineral Co., Tamworth		_	Berry Training Farm, Berry		2 A
Beef Shorthorns)	16	8 ,,	R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	3,
. Toohev. "Mandemar," Bertima	56	8 ,,	Liverpool State Hospital and Home	102	10,
combe State Hospital and Home	146	13 ,,	K. W. D. Humphries, "Karoola," Muswell-		
S. Grant, Braidwood		14 ,,	brook	162	24 ,
Hannaford, Braidwood	24	14 ,,	H. F. White, Bald Blair, Guyra (Aberdeen		
rer Memorial Agricultural High School,			Angus)	137	26,
lemingha	27	17 ,,	St. Michael's Orphanage, Baulkham Hills	18	5 ,
m Home for Boys, Mittagong		18 ,,	F. C. Harcombe, Hillcrest Farm, Warialda		
Vincent's Boys' Home, Westmead L. Killen, "Pine Park," Mumbil	19	19 ,,	Road, Inverell	32	15 ,
M. Edwards, Uralla	201 5	20 ,,	Grafton Experiment Farm	100	15
M. Edwards, Uralla East, Gun: Flat Road, Inverell	5	22 ,,	Sir F. H. Stewart, Dundas	190	
Brownlow, Gol Gol		22 ,,	B. N. Coote, Auburn Vale Road, Inverell	10 1	30 14 M
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nacy Department, Rydalmere Mental	33	26 ,,	A 12 Ligging "St Lager Dairy" Kuring-gu	41	2/ 3
lospital	48	27 ,	A. E. Liggins, "St. Leger Dairy," Kuring-gai Chase Road, Turramurra North	52	7 Ju
I. Fairbairn, Woomargama	210	26 Sept.	Kahlua Pastoral Co. "Kahlua" Coolar	314	10
and C. Ryall, 5 Western Avenue, West	•••	20 Sept.	Kahlua Pastoral Co., "Kahlua," Coolac W. Budden, "Hunter View," Kayuga Road,	3/4	, ,
Vollongong	57	z Oct	Muswellbrook	18	5 A
J. Stephenson, "Hill View," Fig Tree	23	10 ,,	The William Thompson Masonic School,		3
C. Wvatt, Sherwood Road, Merrylands	20	12 ,,	Baulkham Hills	50	29
sman Bros., Inverell	25	17 ,,			28
wkesbury Agricultural College, Richmond	-5	-, ,,	J. McKenzie, Inverell Navua Ltd., Grose Wold, via Richmond	33	i '
Jerseys)	128	18	[[ ([erseys)	113	4 Se
enhoe Estates, Scone	65	31 ,,	Australian Missionary College, Cooranbong	113	8,
nacy Department, Gladesville Mental		-	Department of Education, Gosford Farm		i '
lospital	22	14 Nov.	Home	40	29
hurst Experiment Farm (Ayr-hires)	21	18 ,,	A. L. Logue, "Thornbro," Muswellbrook		13 O
W. Martin, "Narooma," Urana Road,			Barnardo Farm School, Mowbray Park		4 _
Vagga	150	29,	Wollongbar Experiment Farm	112	4 D
G. Wilson, Exeter (Jerseys)	68	29 ,,	State Penitentiary, Long Bay	10	9
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Garvie Smith Animal Health Farm, Liver-		1943	Limond Bros., Morisset	60	13 J
acy Department, Parramatta Mental	65	r Feb.	Department of Education, Yanco Agricultural		6 F
lospital		4	High School	69	1 -
Sydney Church of England Gramman	31	Α,,	Riverina Welfare Farm, Yanco St. Ignatius College, Riverview		6
chool, Moss Vale	55	6	C. Wilton, Bligh Street, Muswellbrook	25	27
lor House School, Moss Vale		. ,,	N. L. Forster, Abington, Armidale (Aberdeen	75	3
yong School, Moss Vale	1 2		Angus)	188	12
w England Girls' Grammar School, Armidale		7 "	Forster and Sons, Abington Armidale (Jerse ys)		13
E. Stace, Taylor Street, Armidale	31		Wagga Experiment Farm (Jerseys)	81	20
w Lngland University College, Armidale .	13	7 ,, 1 Mar.	Lunacy Department, Callan Park Mental		
Boland, "Seaton," Invereli	1.3	1 mai.	Hospital	26	1 M
Boland, "Seaton," Inverell ker Bros., Hampton Court Dairy, Inverell	105	î ,"	T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 J
D. Frater, King's Plam Road, Inverell	104	î ,,	New England Experiment Farm, Glen Innes		, ,,
C. O'Dea, Perry Street, Dundas	28	19 ,,	(Tersevs)	73	27
ungie Experiment Farm, Trangie	138	Iy ,,	G. T. Reid, " Narrengullen," Yass	178	3 J

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area.

Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry.

## Poultry Notes.

(Continued from page 394.)

2. The very frequent wastage resulting from cleaning on certain types of machines can probably be reduced by exercising meticulous care in keeping the mechanism which comes into contact with the eggs as

clean as possible, and by seeing that the machine is kept dry between periods of use.

3. Eggs which are initially clean should be separated and should not be passed over the machines.

## Brucellosis-free Herd Scheme (Swine).

#### LIST OF ACCREDITED HERDS.

In following is a list of the names and addresses of owners of herds which have been declared brucellosisfree in accordance with the requirements of the Brucellosisfree Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only heids belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals will be accepted for inclusion in the list. A charge will be made for the work since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two sein annual tests will be required and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Adams J.P. Melton Daysdak
Allard S.R. Ckobury Stud Wero ni te Road, via Camden
Bathurst I speriment I aim
Bathurst I speriment I aim
Bathurst I speriment I aim
Winderal via Gosford
Creek S.D. Condidata? (c. loggons
Cowa I speriment I arm Cowa
Cowa I speriment I aim
Cowa I speriment I aim
Cowa I speriment
Draper k. I. Glengar Capettee
I uter Mem 110 Agric altural High School Nemingha
I slev Mis F. Bligh Stud Pafery
Water I aim, Rouse Hill
Crafton Experiment Earm Grafton
Herris K. R. Pennaut Schol Papery, Purchase Road, West
I emmut Hills
Hawkesbury Armultural Cilege Kalbinond
Holl and A.L. Aig onne Lift all

John Mu arthur Agricultural High School, Glenfield Jiverpool State Hospital and Home, I iverpool Maybin N C., Fow ic, Orange McCaughey Mcmorial Agricultural High School, Yanco New England Lypeninent Farm Glen Innes Newington Stite Hospital and Home Newington Riverina Welfare I arm, Yanco Government Agricultural Fraining Farin, Schicyville Shirley G I, Camelot' Penrith Smith J M, Fulo Glen, Urana Stewart Sur Frederick 'St Cloud, Dundas, Wig, a I yperiment Farm Bomen White A N, Blikeney Stud Oringe Williams G R B Gwandilan, Grenfell Wilson A G Blytherwood Fyeter Wollongbar Fyperiment Farm, Wollongbar

#### Herds Other than Registered Stud Herds.

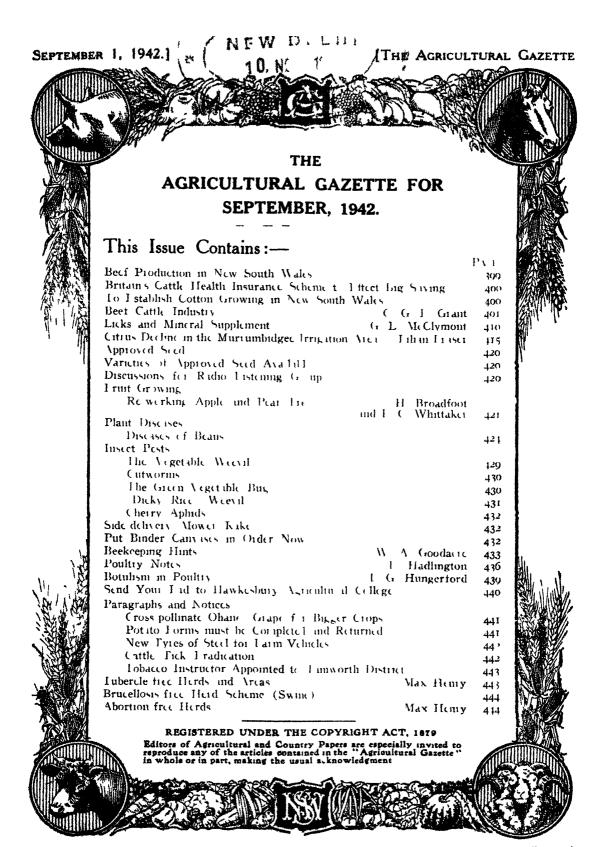
Bathurst C. 1 Bathurst
Berry Trairing Firm Berry
Brokhold Afferest thon Comp Minnus
Callan Park Mental Hespital Callan Park, Rozelle
teet H. M. Salisbury Court. Uralla
Glen Innes Frisen Camp. Glen Inne
Gosford Farm Home for Boys Gostord
Goulburn Kefamatory Goulburn
Kenninge Mental Hospital Kenmore via Gulburn
Maisset Mental Hospital Maisset

Obvion Prison Camp, Oberon
Orange Mental Hospital Orange
Purramatta Gaol Parramitta
Parramatta Mental Hospital Parramatta
Peat and Milson Islands Mental Hospital Hawkesbury River
Pollak V Marata Harrow Road Glenfield
Smith (W. ) 'Norbiton Canadian Lead
Stockton Mental Hospital Stockton
Waterfall Sanatorium Waterfall

### Abortion-free Herds.

Fire following heads have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free

Owner to I Address	Numiter in herd	Owner and Address	Number in herd
Bathurst Lxfein ent lurn (Avishies) Bruth P A Holbiox   Bush W, B n l cm ind Carri I G (10ml a central lilba Carri I A divident of launa form flome for Boys Groford Departem int of launation furn flome for Boys Mittagein, Dayson K (11m central lilba Launa for Mittagein, Dayson K (11m central lilba Launa for Launa flomential dagin dilural lilba Launa flomential dagin dilural lilba Launa flomential dagin dilural lilba Hankesbury Agrendian (Olloge Kachmond (Ierseys) Hicks A A Fetate Culcarri Hill I Pritchard Bowling Alley Pt (Jerseys) Hindern L D (thramitta (A US) John Meatithur Memorial Agin ultural High School, Glonfield Killen I I Pre Lark Mumph Leitch J F Jun'indge Wirner (Aberdeen Angus) McLachern, H Lincutta (Red Poll) McSweeney, W J 'The Rivers,' Cancemind (Jerseys)	39 202 48 9	McSweeney, W J ' Ihe Rivers,' (anowindra (Beef Shorthorns) Martin Bros.,' Naicoma Urana road, Wagga Morisest Mental Hespital Navia 1 td Grose Wold via Richmond (Jerseys) New Ingland I aperiment 1 arm, Glen Innes (Jerseys) New Ingland University College, Armidale Peel River I and and Mineral Co., (Beef Shorthorns) I imworth Reid, G I Nairangullen," Yass Robertson, D H Scom Rydalmer Mental Hospital, Rydalmere Salway, A I, Cobargo Skinner D S, 'Wyworrie," Ben Lomond Smith Jas C, Ben Lomond Stewart Sir I rederick, "St Cloud Stud," Spurway stivet Dundas Trangie I xperiment Farm, Bomen, N S W Walker, Jas R, "Strathdoon," Wolseley Park White, I J, and Sons, Bald Blair, Guyra (Aberdeen Angus) Walliams, Chas, Ben Lomond Young, A H, 'Rock Lynn," Cudal (Polled Beef Short horns)	31 125 80 132 97 16 60 120 171 82 30 66 6 88 81 32



#### COMMONWEALTH DEPARTMENT OF HEALTH.

## ENTERO-TOXAEMIA ("Pulpy Kidney") in Sheep & Lambs

Prevent this disease by using "Commonwealth" Entero-Toxaemia Vaccines.

(a) Entero-Toxaemia Vaccine (Alum-precipitated). DOSAGE: A single dose of 5 c.c. This vaccine confers a higher immunity than that which follows the ordinary type of vaccine.

The above vaccine is not recommended for vaccinating export lambs at the usual sites, such as inside the thigh or in the region of the brisket, on account of the possibility of blemishes occurring in the dressed carcase. The vaccine may be used in such lambs at sites which would not affect the dressed carcase, such as the loose tissue just above and inside the knee.

If it is not desired to use the Alum-precipitated vaccine, the following vaccine may be used.

(b) Entero-Toxaemia Vaccine. DOSAGE: For sheep or lambs—a single dose of 5 c.c.

(NOIL in flocks where the mortality is expected to be heavy or where mortality still occurs after a 5 cc dose has been given, a second dose of 5 cc should be administered). This recommendation applies to both vaccines

50 c.c., 1/6d.; 100 c.c., 2/-; 250 c.c., 3/6d.; 500 c.c., 6/-; 1,000 c.c., 10/-. Six 1,000 c.c. containers, 50/-.

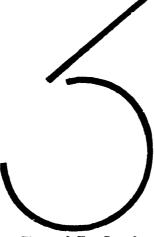
The above vaccines are available from the Chief Quarantine Officer (General), C toms House, Circular Quay, Sydney, and the Commonwealth Serum Laboratories. The vaccines will be despatched within 24 hours of the receipt of orders

Containers will be forwarded per train or post as desired immediately on receipt of order. Freight or postage extra.

## COMMONWEALTH SERUM LABORATORIES. PARKVILLE N.2, VICTORIA.



Midget Scoop Calf Dehorner, 15/- each. Postage 1/-.



Fire and Tar Brands made to order.

9

Calf Earmarker
"Note"
39/6.

Specialists in Steelware for the Countryman.

W. JNO. BAKER LTD

3 HUNTER STREET, SYDNEY.



## The Agricultural Gazette.

September, 1942.

## Beef Production in N.S.W.

C. G. F. GRANT, Herdmaster.

WITH its ever increasing population, the State of New South Wales is destined to become the greatest beef consuming State in the Commonwealth. The problem of supplying these requirements is in front of us.

As a beef-producing State, we have not, nor are we likely to reach that stage of production which Queensland has reached. This, no doubt, is due to climatic conditions, areas available and to general conditions of farming, which lean towards the production of wool, wheat, mutton, lamb and dairy produce. For our consumption we draw heavily either in the form of frozen beef or beef on the hoof from neighbouring States. With our greater population we have perhaps a more discriminating purchasing public, which has rapidly absorbed modern ideas of beef requirements.

As regards the standard of quality in beef produced, we, in New South Wales, could do much more than we do. We have a decided advantage over other Australian States in that the principal beef cattle studs are maintained either within the State or at no great distance from our borders. By comparison, our holdings are smaller than in Queensland, which should result in fewer numbers but better quality animals. Still, the fact remains that our beef producers

have not yet made a name for New South Wales beef. It can be done, but not until producers concentrate their energies on better feeding methods and give more attention to the quality of the animals bred.

In the beef industry, we have to an extent suffered from an inferiority complex; Argentine beef has been always held up to us as an insurmountable hurdle. So it was with our butter and fat lambs; Denmark and New Zealand were constantly quoted, and there were those in Australia who were prepared to accept the theory that we would never be able to compete with those countries.

Though the Argentine and other beef-producing countries which supply beef to Great Britain and Europe possess many advantages which enable them to compete successfully with Australia, they possess one disadvantage, which in the future will count more and more in our favour—they do not belong to the British Empire.

Granted that Argentine beef is excellent (at least that percentage which is exported) and their marketing organisations perfect, yet there is no reason why Australian beef cannot be brought very close to, if not equal to, that of the Argentine in quality. Now, if ever, we should concentrate on the production of beef. I see no primary industry for which the prospects appear brighter. Beef can be stored on the hoof in our paddocks, which may be more economical than the cost of cold storage under existing conditions.

The requirements of beef for the world's markets when the war is over will be enormous. Shall we be in the position to take advantage of requirements overseas? What type of beef is the best to produce?

Production depends on consumption, and consumption will depend on the individual. We must produce a beef which appeals. Very young beef does not appeal to most people; it lacks taste and

is lacking in appearance and colour. In the same way, old beef attracts still less—tough to chew and difficult to digest.

The ideal beef is produced from the well-fed, well-bred steer slaughtered at from three to three and a half years old. In some instances this stage may be reached at from two and a half years of age. The dressed weight of such a carcase should be from 650 to 750 lb. This beef is tasty, attractive in appearance, and when cooked contains the requisite gravy, which appeals to housewives. There is also a demand for beef dressing out at 300 to 350 lb.

Most British breeds of beef cattle, such as Hereford, Shorthorn, Aberdeen Angus, Devon and Red Poll cattle, produce excellent beef under Australian conditions. The ideal carcase is to be found in the modern type of Aberdeen Angus cattle. Here one sees the correct marbling of beef and the compact joint so much sought after.

However, much of the value of our work in feeding and breeding on modern lines can be lost by carelessness in marketing. Having to travel long distances to trucking yards, rough handling when being trucked and bruising in trucks, all spell loss to the producer, and act as a brake on the development of the industry.

Here, in Australia, we still have to contend with the problem of speeding up transport

Quicker and safer loading facilities and the satisfactory transport of "horned" cattle are still problems awaiting solution. The Americans schedule their stock trains second only to the silk train in speed, and have regular spelling depots en route. They have adopted "end-on" loading, and the de-horning of cattle, either by natural or artificial means, is almost a universal practice amongst cattle raisers.

When comparing our cattle-raising operations with those of other countries, we must not for one moment imagine that we are the only producers of a percentage of inferior beef stock. Throughout the United States of America and the Americas there are many inferior cattle. Unlike Australia, those countries have such immense populations that a ready market is found for the inferior quality beef. The Spanish element look for plain lean meat, which, for the most part, is cooked in olive oil, and the native populations consume the cheap unexportable article. It is thus possible to show the world only "choice beef."

In New South Wales there is always a sound trade in veal. Vealers should be produced with out any check in their period of growth, so that when slaughtered at from eight to ten months they will dress out at from 120 to 220 lb. When marketing these animals, quick transport is essential, so that the animals will retain bloom.

### Britain's Cattle Health Insurance Scheme to Effect Big Saving.

FIFTY million gallons of milk each year, as well as large quantities of meat, are expected to be saved in Britain by a health insurance scheme for dairy herds, the first of its kind in the world.

The object is to reduce losses caused by the four principal scourges of dairy cows-mastitis, contagious abortion, sterility and Johne's disease. Although the scheme is entirely voluntary, it is expected that 30,000 British herds, comprising nearly half a million animals, will be registered in the first year.

The farmer selects his own "vet.," who, in return for annual fees ranging, according to the number kept, from 2s. 6d. for heifers to 12s. 6d. for cows, examines the herd at least four times a year and also makes any further visits required for treating animals affected. The farmer, on his part, is expected to look out for the first symptoms of disease and to comply with certain control measures.

The scheme will be run jointly by Britain's National Veterinary Medical Association and the Ministry of Agriculture who are providing free laboratory services for diagnostic work, and vaccines and drugs either free or at reduced cost A small committee is to be set up by the Ministry to settle disputes between the farmers and the veterinary surgeons.

The full scale of fees is:—128. 6d per annum for every cow in herds up to and including 10 cows; 10s. per cow in herds of 11 to 50 cows; a flat rate of 10s. per annum for every cow in herds of over 50, and 2s. 6d. for each heifer from the age of six months to the day of first calving. If animals are treated with sulphanilamide a furthur 2s. 6d. per animal is to be charged.

thur 2s. 6d. per animal is to be charged.

Contracts will be for a minimum period of one year, but in the case of longer contracts, fees will be subject to a 10 per cent. reduction in the second year and 20 per cent. in the third year.

### To Establish Cotton Growing in New South Wales.

THE Department of Agriculture is seeking the co-operation of farmers in likely districts who are prepared to experiment with the growing of cotton this year. Districts in this State which approximate those of the American cotton belt are parts of the north coast, portions of the north-western slopes and of the upper Hunter, small parts of the central-western and south-western slopes, and the various irrigation areas.

Cotton is a very important war requirement, not only as a basic material for textiles, but also as a source of pure cellulose for the manufacture of explosives, lacquers, etc. The seeds produce a valuable edible oil and the press-cake is used as stock food.

In normal times Oneensland produces about one-third of Australian requirements, the remainder being imported chiefly from U.S.A. and India. Under present conditions increased local production of cotton is imperative, and (Continued on page 419.)

#### OF FRONT LINE IMPORTANCE.

## Beef Cattle Industry.

## Aberdeen Angus Breed Plays a Leading Part.

C. G. F. GRANT, Herdmaster.

BEEF raising in Australia has been, and probably always will be, one of our major primary industries. At the present it is one of front line importance. In the development of the industry many breeds have played their part, more especially the Shorthorn (sometimes referred to by old hands as the Durham) and the Hereford. Both breeds have stood the test well and to-day enjoy an envied place amongst our breeders. Breed prejudices and breed controversies lead nowhere; they are more often than not the petty "bubblings over" of poor sports and breeders who are aware of their own limitations.

11 is to the Aberdeen Angus cattle that we must give credit for the rapid improvement in type, early maturity and beef quality in modern breeds. They set a pace in keeping with their reputation and the other breeds have been forced to fall into line.

#### History of Aberdeen Angus Breed.

The history of the Aberdeen Angus breed is the record of careful breeding on the part of shrewd Scottish farmers not always blessed with an oversupply of the world's goods that make life easy. "Adjacent to Aberdeenshire on the south lies the county known as Angus—recently Forfarshire. In these districts have been evolved, through processes and procedures which have never been clearly demonstrated, two local bovine types, known in Bucan as hummel or humlies, and in Angusshire as dodded or doddies, both mostly black and mostly hornless." So wrote Alvin Sanders in his excellent history of the breed.

Sanders stresses an important factor in the "making" of the breed, in the close co-operation which has existed in Scotland between landlord and tenant. This factor is probably the secret of the success of British livestock breeders. Thus we read of the great influence which Lord Panure, of Brechin Castle in Forfarshire, brought to bear on tenants of the vast Panure estates in connection with the work of improving the Aberdeen Angus breed, as

the local polled breed came to be known. It is recorded "that it was largely II is Lordship's urging that started both Alex Bowie and William Fullarton in their great work as breed builders, and he supplied the foundation bull 'Panmure' (51), the concentration of whose blood constituted the basis of one of the most notable advancements in bovine animals." "Panmure" was out of "Black Meg of Panmure."

### Early Aberdeen Angus Breeders.

Hugh Watson, of Keillor did much to foster the breed. He is acknowledged to be



A Quiet Temperament and Early Maturity.

Associated qualities usually found in the
Aberdeen Angus Breed.

the first great improver of the "Northern Polls." We read of "Old Grannie" (1) and his "Jocks" of varied nomenclature. William Fullarton was another such man whose work in helping to lay the foundation of the breed deserves special mention. It was he who selected "Black Meg" (766). Mated to "Panmure (51) of Ardovic," this cow bred "Queen Mother" (348), foundress to the meritorious "Queen" tribe.

Born at Tillyfour in 1805, William McCombie became one of the greatest livestock breeders in history. Purchasing "Queen Mother" (348) as a yearling heifer for £12 105., McCombie built up his celebrated "Queen" tribe. His success in the show ring has few parallels in the history of farm stock.

The herd book of the Aberdeen Angus breed was first published in 1862, due to the enthusiasm of Edward Ravinscroft. The second volume was published in 1872, and in 1900 the title of Aberdeen Angus Cattle Society was adopted. As is often the case, early records contain many confusing items, and for those wishing to study the breed history the works of Macdonald and Sinclair, "History of Aberdeen Angus Cattle," Alvin Howard Sanders' "A History of Aberdeen Angus Cattle," also "Aberdeen

Angus Cattle" by Albert Pulling should be procured.

#### The Aim of All Breeders.

It was William McCombie who coined the statement: "The end of all breeding is the block." In other words, it is the production of beef—beef of the desired quality—that beef cattle breeders are interested in-

What then is this quality which we breed in search of? It is a beef that pleases the consumer and at the same time the butcher. The two greatest sources of loss to the retail butcher are excess of bone and excess of fat. We must therefore breed for "fineness," yet quality, in bone. All excesses of fat, both external and internal, must be got rid of. Our trade is a young steer trade. so the quality of meat must be such as shows the correct incorporation of fatty tissue—the marbling so often referred to. The carcase must yield a maximum of primest flesh and a minimum of cheapest Then again, we must study production costs and breed early maturity into our stock Percentage dressing is an all important factor in a carcase. Work it out; compute what the value of bones from a carcase is as compared to the liveweight per pound paid, and the smooth evenly fleshed carcase with the fine quality of bone will soon be sought after.

## There is No Best Breed.

THE question is often asked: Which is the best beef breed of cattle? The unbiassed answer would be: There is no best breed of beef cattle. Possibly there is more variation between individuals within a breed than there is between the average individuals of the different breeds. The selection of a breed is purely a matter of personal choice. However, one would be wise to select a breed in which there is no difficulty of obtaining herd sires.

Beef breeds must possess early maturity qualities. In this direction the Aberdeen Angus cattle have astonished the world Why? Because careful selection for early maturity has been a strong feature amongst Aberdeen Angus breeders. Furthermore, the value of milk as a calf ration has been fully appreciated, and with this end in view, breeders are careful to weed out poor "milkers." Aberdeen Angus calves are small at birth, but they grow and thicken rapidly. Mothers' milk is the secret of success.

#### Selecting the Cow Herd.

It would be wise to warn beginners that the simple rules handed down for generations are

probably the safest in the long run when selecting the cow herd for breeding beef. If a good cow mated to a good bull will produce a good calf, a better cow mated to a better bull should produce a better calf. Dual-purpose cattle are more or less an out-of-date proposition.

Cows selected should carry as much natural flesh as possible and should show quality in bone. Quality of bone is more often than not associated with good handling qualities. Select a uniform type of cow, as this will be a great aid towards held improvement. Your selection of a suitable herd sire is not then so difficult

The cow herd should be selected from studs or herds where it is possible to follow the line of breeding. Selecting the best cows from numerous studs, even though they be show beasts, does not always spell success. Get into a strain of blood—a good strain, a successful strain, and, above all, a strain free from contagious abortion and tuberculosis. Your beef cows must have milking qualities but this quality can be retained within your beef breed by careful selection rather than by introduction of dairy breeds.



"Like Peas in a Pod."
ue to Type. The Photograph Shows a Sire and His Progeny. The Aberdeen Angus Breeds True to Type.

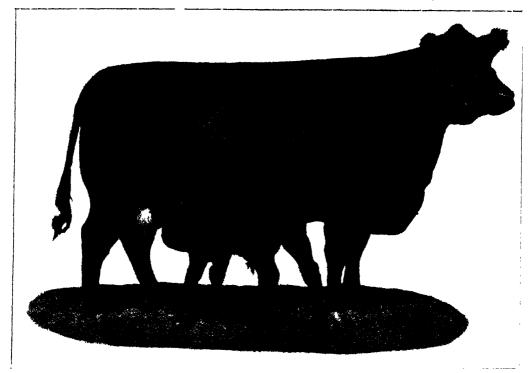
#### Culling the Herd.

Aberdeen Angus cattle are prolific breeders Shy breeders and non-breeders are passengers in any herd. The quickest way to build up a herd is by prolific breeding on correct lines.

Youth in bulls more often than not spells high percentages in calvings An old bull, other than to a stud breeder, more often than not is a loss.

They become rogues, may have contracted disease and do not always transmit the necessary robustness to their calves.

Many cattle raisers have made the vital mistake of culling cows which appear to be low in condition, leaving the well conditioned animals, whereas a careful check would have disclosed the poor conditioned animal to be the breeder and the sleek animal to be either a shy breeder or barren.



Aherdeen Angus Cows are Excellent Mothers.

## How to Select a Bull.

ABILITY to select a bull is the real mark of the successful cattle breeder. Carefully study the two illustrations on the next page. The second bull's commercial value is almost double that of the other. In the show ring the judge's decision went the other way.

It may be that our system of education is at fault, as most students gain their experience by judging and selecting aged animals. There is not nearly sufficient thought given to the study of the young animal. Students are taught that the bull is half the herd; perhaps it would be more correct to say that the bull is more than half the herd. His inherited characters will influence twenty-five to thirty times as many individuals in a season as does that of a cow.

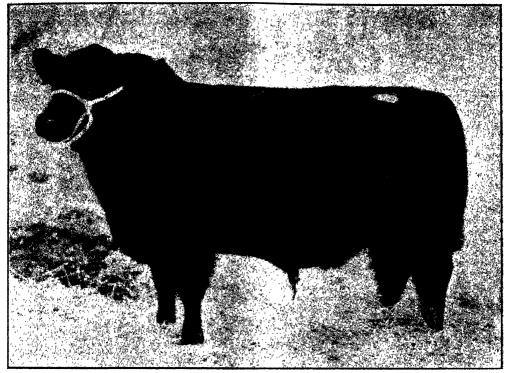
A careful study of a bull's dam is important and a wise first step in making your selection. It is also important to see a line of first-class top sires on his pedigree. A bull must show

breed type, character and quality, he must show fleshing qualities and must have a good constitution and sound legs.

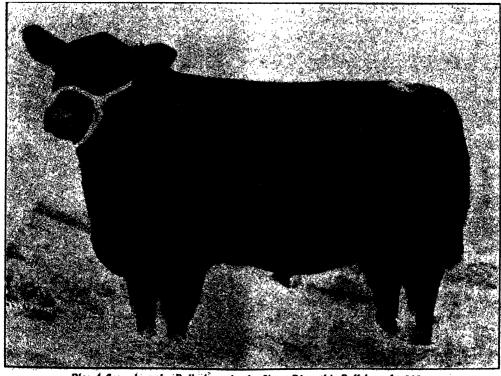
Beginners often make a mistake in buying a bull calf and rearing it themselves. It is not a wisc investment. Purchase a well-grown young bull of the desired type as your first herd sire. Do not try and save on this, your first, investment. Of late years there has been a tendency to breed away from masculinity and character. This should be strictly guarded against; a bull must be a bull and full of sex instinct and character.

#### Care of the Bull.

The purchase of a bull is an investment from which it is hoped to secure good dividends in the form of good healthy calves of proper type, and as many of them as possible within reason. Unless the investment is wisely made it can become, as it were, a drug on the market.



Champion in the Show Ring. Subsequently brought 460 gs.



Placed Second to the Bull above in the Show Ring, this Bull brought 950 gs.

Overfeeding, underfeeding, lack of mating and excess of mating are all causes of loss in relation to bulls. A bull must be kept in good working condition, given plenty exercise and yarded away from the herd. The bull yard must be securely fenced, as poor yards quickly induce a bull to become a rogue.

## WHEN PURCHASING BEEF CATTLE Insist on T.B. and C.A. Tests.

ALL cattle are liable to contract disease and it is doubtful if any breed is less susceptible or immune than another.

Environment and lack of suitable feed will often reduce an animal's power of resistance and thus render it the more likely to become diseased.

When purchasing cattle, bulls especially, breeders should make it a condition of purchase that the animals successfully pass the T.B. and C.A. tests, applied by a veterinary surgeon.

When the mating season arrives, he should be turned out with twenty-five to thirty cows, according to his age. A yearling bull will breed from fifteen to twenty females. Where hand mating is practised, a mature bull should serve a cow a day during the season, whereas a younger bull should breed a couple of cows per week.

#### Age of Breeding Bulls.

Of late years many breeders are arguing as to whether commercial herds can be built up in quality most quickly by maintaining a high calving percentage.

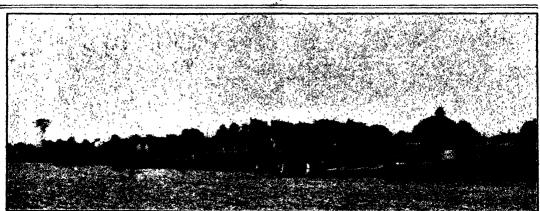
The herd, more especially a stud herd, should breed at least 95 per cent. of calves. Many do less, the cause more often than not being due to the use of old cows and old bulls. Old bulls are sometimes kept, regardless of the number of calves got, simply because they once sired a prizewinner. An aged "proved" bull may be of value, but the percentage of such bulls is generally very low. More often than not they are either sold or dead before that fact is realised. The average breeder would be better advised to keep young vigorous bulls, and they should be tested for contagious abortion and tuberculosis.

#### Neck Chains Used in U.S.A.

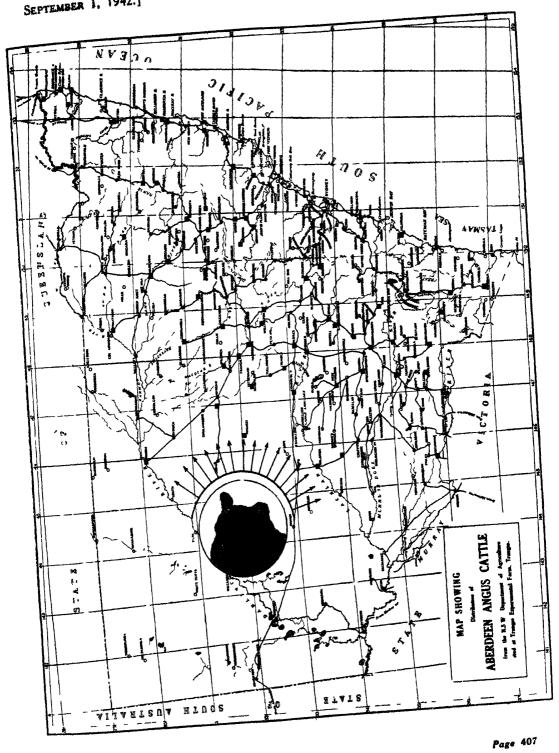
In the United States it is common to see stud cattle with neck chains to which are attached identification discs. The chain is sometimes placed around the horns of cows.

Although the herd societies in Australia insist on tattoo identification marks, neck or horn chains might appeal to some owners as an additional ready means of identification.





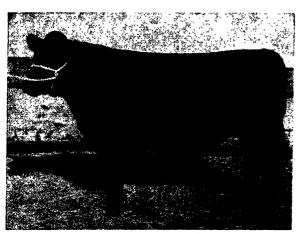
Where Beef is Produced the Teams Must be Kept Moving to Provide Fodders for Droughty Periods.



## Aberdeen Angus Crossbreds.

FOR the production of beef in Australia crossbreeding will always play a part. What breeds to cross and to what extent the mixing of breeds should be carried out are purely matters of commonsense. Crossed beef breeds in most instances give excellent results and at times give more satisfactory results than purebreds.

The Aberdeen Angus crossed with most beef breeds gives 96 to 98 per cent. of polled progeny of excellent colour and type. In most



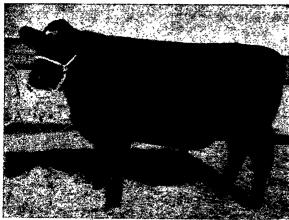
Aberdeen Angus-A.I. Shorthorn Crossbred.

instances where the beef bull is used on the dairy cow the progeny are good vealers. The calf is invariably well fed by its mother.

invariably well fed by its mother.

The crossing of such breeds is a common practice in Great Britain, Canada and America.

Recently the Department exhibited two cross-



Aberdeen Angus-Ayrsbire Crossbred.

bred steers as examples of what could be produced by mating dairy cattle with Aberdeen Angus bulls. Illustrations of these steers are shown hereunder; one the progeny of an Aberdeen Angus bull on an Ayrshire cow, and the other from an Australian Illawarra Shorthorn cow. The former was born on 31st April, 1940, and the other on 19th August, 1940.

Both animals were fed on exactly the same lines, weighted and slaughtered on 31st March, 1942. The weights were as follows:—

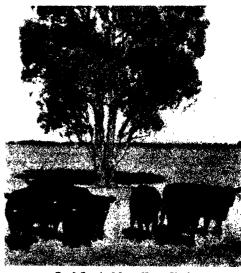
Live Dressed weight. weight.

704 lb.

Aberdeen Angus x Ayrshire 1,174 lb. Aberdeen Angus x Australian

Illawarra Shorthorn .. 1,294 lb. 806 lb. Both carcases were classed as excellent com-

Both carcases were classed as excellent commercial carcases. This was confirmed by the prices realised, viz., 20½ gns. each. These steers were grass fed till four months prior



Beef Cattle Must Have Shade.

to showing, after which they were paddocked and handled.

Throughout the four months of hand feeding the animals had access to wheaten hay at all times. In addition they received:—

1st Mouth.

I lb. Crushed oats.

2 lb. Bran.

2nd Month (1st two weeks).

I lb. Linseed meal.

4 lb. Oaten chaff.

For the second half of the month the crushed oats was increased to 2lb., the bran to 3 lb., and the chaff to 6 lb. The ration was further increased by:—

3rd Month.

1/2 lb. Linsced meal.

1 lb. Crushed oats.

1 lb. Bran.

4th Month.

To the ration feed was added 6 lb. of boiled barley.

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On the hoof the steers measured up well. The only obvious fault being a tendency to lightness in the hindquarters as compared with pure bred beef steers. When dresand the appearance of the flesh was excellent showing good marbling. There was, however, one slight fault—the flesh, to a keen judge, showed a tendency to "oiliness," possibly due to feeding slightly too much linseed meal in the lation

#### Dairy Cattle as Beef Producers.

The idea of using dairy cows for beef production is sound, especially when the beef bull

15 used with Australian Illawarra Shorthorn, Ayrshire or Jersey breed

The practice of buying up old dairy cows and taking them to stations for mating with beef bulls is not recommended, as the risk of introducing disease is too great. Buy dairy heifers and cross them, yes. For their first calf it might be wise to mate them with a dairy bull, as the loss from difficult calvings would be lessened considerably. After the first calf there is seldom trouble. Crossed with the Aberdeen Angus bull, dairy bued heifers seldom have trouble, as the Aberdeen Angus calves are usually small at buth

### Pedigrees.

Pedigrees may be presented in two forms -

#### Form A.

EVADER OF HARVIESTOUN 52626.

Calved 30th May, 1922

	suc Euripus of Ballindalloch	43615 Su G M Grant
dam Evergoli of Harviestoun	56657 by Prince of the Wassail	23751 Sir (, M (,rant
2 d Evergood	35859 by Kidnapper	9300 Sir G M Grant
3 d Lugola	25492 by Goldsworthy	12553 Sn (r M Grant
4 d Fukoma	20562 by Γ ildorman	8254 Sir G M Grant
5 d Furva	13708 by 1 10vost	1259 Sir G. M. Grant
6 d Fugenie of Ballindalloch	4170 by Judge	1150 Sir G M Grant
7 d Eisa	977 by Tropin	402 Wm M'Combic
S d Erica	843 by Cupbearer	59 A Bowie
9 d Lmily	332 by Old Jock	1 Hugh Watson
10 1 15 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	T7 11	• •

10 d Beauty bied by Hugh Watson Keillor

i vergell is also dam of I mblem of Harviestoun 43417, ist and reserve champion at Petth, sold for 2,800 guineas, 1919. I dispuse of Ballindallech won 1st prize and made the highest price, 2,800 guineas at Petth, 1919. It is the sire of Prince I weiful 400 54, which won 1st prize and charpionship at Petth 10-1 made 2,800 guineas, and of Prince Peaceful of Harviestoun Feith champion 10-4, sold for 1,050 guineas to H M. the King.

Awarded 10 Faist Prizes. 2 Gold, 12 Silven Medals.

Form B. EXTENDED PEDIGREE OF LVERWISE 24436. ( I due 9110 Mailbag 13637 f Ihad 2543 Edelweiss 5605 21465 Mad of Honour 20265 Julius Cæsar 7637 Beggai Maid 16085 Llate 16513 Albion 6525 1 sbros 10816 Masemore Equality 11208 Plate 24028 I leusa 12428 Frioll 2723 Elkara 9926 Nortolk 5th 7022 Norfolk 3082 Dalc 3rd 13285 Naomi 3rd of Powric 10551 jo Su Maurice 1319 Prunell of Cortachy Prudence of Cortachy 5109 Wizard 13281 Wych I lm Mon wich 8th 11093 29284 Witch of Endor 35th Monarch 5th 4889 Everwise 24438 26106 Witch of Endor 9th 14293 Witch of Endor 25th Norfolk 5th 7022 Witch of Endor 12th 17171 22348 1 dric 9110 lhad 2843 Prospero of Dalmore L'Iclweiss 5605. 11208 Pride of Dalniou Lord Ivory 6179 Eimco 12450 7th 16732 Pride of Guisachan 14th 10097 ergreen 7th 33414 Ihad 2843 Etoman 1658 l ola 19251 Inky 4381 Eleuthera 13704 Erroll 2723 Elkara 9926 Royer 12th of Powrie Norfolk 5th 7022 Blackwood of Auch-11267 Ruby 15th of Powne 10559 orachan 13195 Prince of Aberdeen 6332 Sunshine 12th 14261 Evergreen 3rd Sunshine 6th 9213 Lquestrian 9953 28127 Prince Inca 7844 Equation 1/047 Evergreen 2nd 21835 fustice 1462 Evergreen 9929 Edelweiss 5605 (Continued on page 435)

## Licks and Mineral Supplements.

## The Requirements of Sheep, Cattle, Pigs and Horses.

G. L. McClymoni, B.V.Sc., Veterinary Officer

THERE is probably no field of stock raising more exploited than the field of mineral nutrition—and only a wider knowledge of the mineral requirements of stock, of the likely deficiencies and the most economical and efficient means of countering these deficiencies will curb this exploitation.

The number of trens manufacturing licks, the advertising devoted to them, the needless compleasty of many of the mixtures, all testify to the importance much of it unjustified, that is placed on these compounds. It would perhaps be not too great an exaggeration to say that if a large proportion of the money and time invested in licks were put into more permanent improvements such as fodder conservation and improved pasture there would be increased teturns from livestock. That is not to say that mineral supplements are unnecessary, for under certain circumstances they are absolutely essential. But what is a lick or mineral supplement? It is a material or mixture of materials primarily designed to provide certain inneral elements to stock

'if little is good more is better but nothing fur ther from the truth could be imagined. If an animal is receiving sufficient minerals in the feed to meet its requirements then an excess of nunerals will not only impose an unnecessary load on the animal's exerctory mechanisms, but may

waste of time and money. It must also be realised that no amount of minerals will take the place of other food constituents, such as proteins and carbohydrates, nor will an oversupply increase the efficiency of utilization

Lirst consider the actual minerals that are required in the animal body. They constitute a formidable list -Calcium, potassium magnesium iron, copper, cobalt, manganese, zinc, phosphorus, sulphur, chlorine, iodine, and possibly others, but fortunately only a few are ever likely to be lacking in New South Wales pastures or stock teeds

Consider the commonest stock lick component, salt or more correctly common salt or sodium chloride. More miraculous powers have been assigned to salt than to any other mineral supplement and it is only recently that the value



of salt for stock has been questioned. It is now realised that only under certain conditions are sodium and chlorine supplements needed by stock—that is, only under certain conditions is the use of salt justified. The mineral, including sodium and chlorine, content of pasture and crops is influenced by many factors—drought, maturity and poor soil indicating low content, and young growth and rich soil indicating high content. Various species of plants appear to differ in their mineral content, and grains, in particular wheat and maize grains, are generally low in sodium and chlorine.

#### Salt Requirements of Sheep.

For sheep the only conditions under which sodium and chlorine might possibly be lacking, and salt justified, are where feed is mature and dry, or where cereal grains comprise a large part of a drought ration. Poor soil, hot weather, and lactation increase the risk of deficiency under these conditions Of course, sheep will take salt at all times of the year and on all kinds of feed, but it has been observed that the salt consumption falls markedly when good feed is available. This is possibly related to the increased sodium and chlorine content of the feed, but observation and experiment tend to the belief that the consumption is more likely to be related to the palatability of the feed, the salt intake being increased as the feed becomes less palatable, the salt acting more as a condiment than a supplement

The average amount of salt consumed by sheep in New South Wales is 1½ tons per thousand per annum in normal seasons, rising to 3 tons per thousand per annum in dry seasons, i.c. about 1 to 2 oz. per sheep per week. In the western

areas salt consumption is very low

Experiments on departmental farms in New South Wales where sheep have been divided into two mobs, and one allowed access to salt, have shown absolutely no difference between the two mobs. i.e., no benefit from the salt. This would be expected to be the case in western areas on bore water and salt bush, but these observations have been made on places as dissimilar as New England and Sydney, on sheep both fully and partly pasture fed

Salt has a value in sheep management, other than as a mineral supplement, in its use in salt fodders to regulate the consumption of feed. This method is only commendable on large properties where labour will not allow of regular feed distribution, as the salt in excess of requirements is valueless to the animal, being quickly excreted in the urine. High intakes may have an undesirable effect in reducing the digestion of fibre which takes place in the paunch or rumen. Mixed as a low percentage in feeds, salt may also be useful in accustoming sheep to new or unpalatable material.

#### Salt Requirements of Cattle.

On good quality pasture it is practically certain that salt is not necessary as a mineral supplement for dry cattle or those of average milk production, but to be on the safe side and to avoid any possible deficiency, I oz., and up to 2 oz. for high producers, should be mixed with the feed when hand-feeding, and plain salt or bone meal and

salt licks made available. As salt acts as a condiment or appetiser to cattle, its use, say, as ½ to I per cent. of the ration is justified even under conditions when it is unlikely to be of value as a mineral supplement, as it will tend to increase consumption of feed, especially if this is of an unpalatable nature. Cattle when completely deprived of salt other than that obtained from feed low in sodium and chlorine content, will develop an abnormal craving for it after several weeks, but it may be several months or up to a year before symptoms of salt deficiency are noted, the time depending on milk production and the incidence of calving. Symptoms noted are decreased production, loss of condition, and even sudden death

#### Salt Requirements of Pigs.

Growing pigs feeding on grain products only have been found to suffer from a salt deficiency, but no deficiency is noted when the grain is supplemented by animal by-products such as meat meal, and probably no deficiency would be present in pigs allowed good green feed, but to be on the safe side, ½ per cent. of salt in the ration, or a salt lick, will guard against any possible deficiencies. Salt mixed in feed may also increase its palatability.

#### Salt Requirements of Horses.

Salt should always be supplied to working horses, especially in hot weather, as sodium and chlorine are lost in sweat in relatively large amounts. Half to one ounce per day in the feed, or a salt lick would be sufficient. (In man, severe cramps may follow excessive sweating due to salt lost in the sweat, so that salt is often added to the drinking water under conditions where such sweating is usual, as in mines)

## Calcium and Phosphorus Requirements of Cattle.

Next to salt, no minerals have had more attention paid to them than those supplying calcium and phosphorus, that is bone meals, bone flours and dicalcic phosphate. This is due to the fact that many of the coastal and other soils of New South Wales are lacking in calcium and phosphorus so that the feed is low in these constitututs, and cattle grazed on this country develop symptoms of deficiency. Phosphorus is the more important mineral in this respect.

This deficiency may be overcome in two ways, viz, increasing the calcium and phosphorus content of the pastures by topdressing with lime and superphosphate, or by feeding calcium and phosphorus supplements direct to the stock. The first method, whilst undoubtedly requiring a bigger capital expenditure, pays in the long run as calcium—and phosphorus-deficient soils will never support rich pasture, and are always especially devoid of the protein—and mineral-rich legumes, that is, clovers, burrs, and lucerne. The response of stock grazed on top-dressed pastures is due to both the increased mineral content and the higher feeding value of the pastures.

Where it is impracticable or not immediately

where it is impracticable or not immediately possible to topdress pastures, bene meal or dicalcic phosphate should be supplied in the feed, or as licks, the amounts being from 1 to 2 oz. per

day, depending on production.

The symptoms of calcium and phosphorus deficiency in cattle are most noticeable—depraved appetite, such as bone chewing, stunted and abnormal growth, limited milk supply, sterility, and distortion and fractures of limbs being noted. The fractures are due to the extreme fragility of the bones caused by leaching out of the minerals to provide sufficient for milk production and bone formation in the unborn calf. Deaths may also occur from botulism, a poisoning caused by the toxins produced by organisms which multiply in carcases and bones chewed by the cattle

If calcium- and phosphorus-rich feeds are supplied to cattle of moderate production, sufficient will be absorbed from the intestines to make up for that lost in the milk, but with high producers the ability to secrete calcium and phosphorus in the milk may be greater than their ability to absorb them, so that no matter how well supplied with minerals, at the end of the lactation these animals are in a state of calcium and phosphorus deficiency. The importance of a dry period with good feed to allow this deficiency to be corrected before the next lactation cannot be overestimated. If this period is not allowed, the animal will commence the next lactation with an insufficient mineral reserve, and its production and economic life will be seriously curtailed

## Calcium and Phosphorus Requirements of Sheep.

For many years it was an accepted and advised practice to feed phosphorus supplements to sheep, the practice being justified by the response of the cattle to these supplements. But recent research work has shown that phosphorus supplements are not needed by, and have no value for sheep, as unless the sheep are being starved, the feed will always contain sufficient phosphorus for them even when it is that which produces symtoms of severe phosphorus deficiency in cattle. This apparently strange phenomenon is explained by the facts that, weight for weight, sheep eat more than cattle, that they are more selective feeders, choosing the younger grass rich in minerals, and that their bones, the most important phosphorus stores of the body, constitute a smaller percentage of their weight than cattle.

However, recent experiments have shown that under certain conditions calcium may be insufficient for normal growth of sheep. When sheep are being largely ied on cereal products such as oaten and wheaten hay or straw, grain, bran, and other products as oil meals, etc., all of which are low in calcium, but with ample phosphorus, or when the only feed available is old dry grass, as in drought time, calcium desiciency is likely to be present. However, if sheep are being extensively fed on scrub, the risk is less, as much of this feed has been shown to have a high calcium content.

Where sheep have apparently responded to bone-meals or dicalcic phosphate, the response has probably been due to the calcium content of these materials.

In experimental sheep evidence of deficiency is most striking, including stunted growth, poor wool production, abnormal teeth development, and death. This calcium deficiency is most unlikely to occur on good green feed, but under those

conditions when it may be present, it can easily he corrected by supplying good lucerne or clover hay which is high in calcium, feeding I per cent. of ground limestone in the feed (1 lb. to 100 lb.) when trough or self-feeder fed, or providing a lick of equal parts of salt and ground limestone (that is, ground carbonate of lime, calcium carbonate-not slaked lime) with a little molasses broken down with water as an attractant if necessary. No harm would result from always having the limestone-salt mixture available to sheep during dry times, as the limestone is extremely cheap (about 25s. to 30s. per ton) and may help in many cases to reduce the salt consumption to a level that is more compatible with the actual requirements of sheep, if any, for salt. Slaked lime is not advised, as experimental work has indicated that the continuous ingestion of this material may be harmful.

## Calcium and Phosphorus Requirements of Pigs.

The calcium and phosphorus requirements of pigs are large, which is only to be expected in view of their rapid growth. Where pigs have an abundance of skim milk, say over 1½ gallons per day, deficiency of either mineral is most unlikely, but with pigs fed cereal grains and limited meat meal or skim milk, calcium deficiency is quite possible. Grazing on crops as lucerne and oats will tend to correct any calcium deficiency, but 1 per cent. of ground limestone in the feed or a lick of three parts ground himestone and one part salt will avoid any deficiency.

The calcium requirement in a growing pig's ration is 0.4 per cent. and the phosphorus requirement 0.3 per cent. The contents in various feeds and rations are as follows:

	Cal- cium Per cent.	Phos- phorus. Per cent.
Giains	0.05	0.5-0.4
Follard	0'05	იტ
protein grade)	0.45	0.2
meal	0.52	0.4
milk 5 lb. grain, plus 1 gallon skim milk,	0.23	0.0
or 2½ lb. grain, plus½ gallon skim milk.	> 0 27	0.2

The usual feeds have sufficient phosphorus, but, if meat meal, skim milk or good green feed is low, there may be a deficiency in calcium. If meat and bone meal is used instead of straight meat meal, no calcium deficiency will occur, but this material is lower in protein than the above grade.

Phosphorus deficiency may occur with pigs fed largely on grain and crops from phosphorus-deficient soils, and may be corrected by I per cent. dicalcic phosphate or 2 per cent. bone meal in the feed, or a lick of bone meal or dicalcic phosphate one part, limestone one part, and salt one part.

Limewater is frequently given to pigs, but its value is rather doubtful. One pint given to a pig eating, say, 5 lb. of feed daily, will increase the calcium intake by only 0.023 per cent.—a rather insignificant contribution. However, as it is in solution it may be more readily absorbed, and may be of some value

## Calcium and Phosphorus Requirements of

Adult horses on good feed rarely suffer from calcium or phosphorus deficiency, but young horses, especially when allowed only cereal feeds, may suffer from an excess of phosphorus over calcium in the ration, this leading, especially with certain strains of horses, to a disturbance of the normal bone structure. The risk is usually small, but a lick or supplements of ground limestone and salt with hone meal on phosphorus-deficient country, is a wise precaution for growing horses.

#### Calcium and Phosphorus Supplements.

There are many such supplements available, but usually they will fall into one of several groups with the following approximate composition:—

	Phosphoric Acid (P <sub>2</sub> O <sub>1</sub> ). Per cent.	Calcium Ovide (CaO). Per cent.	Protein. Per cent.
Bone meal and bone	24	31	20
Extracted bone flour	 3.2	40	5
Di cak ic phosphate	37	30	
Ground limestone		56	

Dicalcic phosphate and extracted bone flours (also known as tricalcium phosphate) can be substituted for each other about weight for weight, and, as they contain about one and a half times as much phosphate as bone meal, can command a somewhat higher price.

#### Iron.

Iron has never been shown to be lacking in the feed of any stock in Australia, or elsewhere for that matter, except in the case of pigs, and the practice of supplying iron salts, e.g., iron sulphate, in sheep licks, especially for drought time use, is to be deprecated, not only on the ground of lack of value of this iron, but on the ground that drought feed is in itself usually binding, and the iron salts will, if anything, tend to accentuate this effect by their astringent action.

The milk of all animals is low in iron, and especially is this the case with pigs. Young suckling pigs, if confined to concrete or wooden pens without access to soil, may be left dependent for their iron intake on this insufficient supply in the milk. Under natural conditions iron is taken in with the soil as the young pigs play in it The iron deficiency will produce a severe anaemia, evidenced by pale eye membranes, unthriftiness, a queer thumping respiration, and, if the condition is not corrected, death.

If the circumstances are such that the suckers cannot be allowed access to soil, twice weekly, place about 50 lb. of soil in the pen and mix into it a solution containing 1/3 oz. of iron sulphate, and 1/20 oz. of copper sulphate. Several days after birth, the young pigs will be found rooting about in this soil, and incidentally filling

their iron requirements. If symptoms have appeared, speedy correction of the condition may be obtained by applying a syrup prepared as follows, to the sow's udder about the teats:—

Iron sulphate	3 OZ
Copper sulphate	½ oz.
Molasses, treacle, or syrup	1 pint.
Water	1½ pints

The copper is not necessarily always deficient, but is added as it is concerned with the process of blood formation.

Adding extra iron to the ration of the sow will not increase the iron content of her milk, so that if the sow is being fed normally no benefit will result from this practice.

#### Copper and Cobalt.

During the last few years extensive research work has been conducted on these elements, and deficiency of either one or both has been found to exist in certain coastal and other soils of South and Western Australia, both sheep and cattle being affected by the deficiencies. The symptoms include general unthriftiness, poor and abnormal wool growth, nervous disorders, anaemia, and sudden death. These deficiencies, under various names, also occur in other parts of the world, and are corrected, either by supplying copper and/or cobalt as necessary, in salt licks, or, in the case of copper deficiency, by topdressing deficient soils with copper salts.

The actual amounts of copper and cobalt required by sheep are extremely small, the figures being about 1/3000 oz. of copper and 1/15000 oz. of cobalt per day. As deficiency of these elements is not known in New South Wales soils, no benefit results from supplying these minerals to stock in this State, and the non-regulated use of copper supplements may lead to death from chronic copper poisoning.

#### Sulphur.

This element is one that centuries-old tradition has deemed of value to stock, but which research has discredited. In fairly large doses, I to 2 oz. for horses and ½ to I oz. for sheep, sulphur has a laxative effect, but the small amounts taken in from licks would have no such action. Though sulphur is absorbed to some extent, it is quickly excreted, and has absolutely no value as a mineral supplement.

The high sulphur content of wool led to the belief that sulphur might be of some value for sheep, but unfortunately Australian and South Arican experiments have shown that the sulphur, to be of value for wool or body growth, must be in the form of amino acids as cystine and methionine. These amino acids can be obtained only from plant material or animal byproducts, and animals cannot themselves manufacture them from sulphur or simple sulphur compounds. Another belief is that sulphur is excreted through the skin, so repelling parasites, but the sulphur when absorbed is quickly oxidised by the body to sulphates, i.e., substances with no parasiticidal action.

The inclusion of sulphur in licks for any animals is totally unjustified and without value.

#### Indine.

Iodine is an essential element for normal life processes, deficiency in animals being evidenced by such symptoms as abnormal development, enlarged thyroid glands, and birth of dead or weak, hairless offspring. In certain well recognised "goitre areas" of the world, iodine deficiency is well known and guarded against by inclusion of potassium iodide in the drinking water or licks.

In areas where the iodine content of the soil is sufficient, the supplying of extra iodine is not followed by any favourable results, and in South Africa, where extensive experiments on sheep were carried out, extra iodine was found to have a detrimental effect on the sheep as regards growth and wool production. Experimental work in New South Wales has also shown no henefit from the inclusion of iodine in licks, which is only to be expected as iodine deficiency in stock is not known in Australia. If any slight deficiency should exist, the widespread use of coarse salt would tend to correct the condition, as this material practically always contains a trace of iodine, which is all that is needed.

#### Other Minerals.

Manganese has been found to be deficient in poultry ration, at times leading to a condition of the bones known as perosis, but deficiency has not been found to exist in other animals.

Potassium, magnesium, and zinc have never been shown to be, or likely to be, deficient for stock in the usual feeds.

#### Miscellaneous.

Sodium sulphate (glauber salts) and magnesium sulphate (epsom salts) are commonly found in lick mixtures, especially for use during drought, as both, when taken in sufficient amounts, have a laxative or purgative action. There may be some value in these salts for this purpose, but considering the small amount of each that would be ingested per day, it is most unlikely that such action results. If it is believed that these salts are having a beneficial action, sodium sulphate should be used in preference to magnesium sulphate, as the latter has a depressant action on the absorption of calcium and phosphorus from the digestive tract.

Wood ash is commonly advised for stock, but in view of the immense variation in the composition—from 0.1 to 0 per cent, phosphoric acid, and similar variations in calcium—and the frequent large amounts of us less material such as silica and charcoal, it is advisable to use more reliable supplements when such are considered necessary.

Molasses is not a mineral supplement, but is frequently used in lick mixtures. It should be used with discretion, and only to accustom stock to new or unpalatable licks, and should be discontinued if possible when this object has been achieved. Otherwise the lick will be excessively consumed for its molasses content.

Such drugs as gentian, ginger, aniseed and fenugreek are occasionally included in licks, but their inclusion and use is totally unjustified.

The initial statement that many licks are of needless complexity will now be appreciated.

Usually no harm will result from the use of such licks, but the fact of their containing many unnecessary though impressive ingredients, does not justify prices above that which should be expected from their relative contents of salt, bone meal, limestone, etc.

#### A Summary of Recommendations.

A summary of recommendations is as follows:—

Note —Quantities mentioned are amounts per day.

#### CATTLE.

Dry cattle or low producers on good soil and leed—usually no supplements warranted.

High producers, or dry cattle on poor feed or on mineral deficient soil—1 to 2 oz. salt and å to 2 oz of dicalcic phosphate or 1 to 3 oz. bone meal in the feed, and/or licks of about two parts bone meal or dicalcic phosphate and one part salt. If grains or grain by-products are being heavily fed, ground limestone can be included, making the lick equal parts of ground limestone, dicalcic phosphate or bone meal and salt.

#### SHEED

On good feed on good soil-no supplements warranted.

On poor feed or hand-fed—lick of about equal parts ground limestone and salt with a little diluted molasses if necessary as an attractant, or plain salt lick and I per cent. of ground limestone in the feed

If a laxative is considered of value, 10-20 lb. of glauber salts to 100 lb. of limestone-salt lick as above.

Pigs.

On cereal feeds with plentiful meat meal or skim milk and with good grazing—probably no supplements necessary, but plain salt lick or per cent of salt in feed a good precaution.

If skim milk or meat meal limited—I per cent. of ground limestone and ½ per cent. of salt mixed in the feed, or lick of three parts ground limestone and one part salt. Bone meal, 2 per cent. or dicalcic phosphate, 1 per cent. in ration, or a lick of equal parts limestone, bone meal or dicalcic phosphate and salt, if on phosphorus-deficient soil, and for suckling sows. Guard against iron deficiency in suckers.

#### Horses.

Working horses-1/2-1 oz. of salt in feed; or plain salt lick or rock salt.

Growing horses—lick consisting of equal parts of salt and ground limestone, or 1 per cent. of each in feed with hone meal or dicalcic phosphate in place of half of the limestone on phosphorus-deficient soil.

It must not be gathered that these recommendations for routine use automatically condemn the use of other supplements. For treatment of individual cases of sickness in stock, iodine, iron, sulphur, and drugs as gentian, aniseed, etc., are valuable aids, but should only be used at such times and in such doses as directed by competent advisers. Nor must it be considered that the present knowledge of mineral deficiencies in New South Wales is complete; prohably it is not; the recommendations given, however, cover all known and suspected deficiencies.

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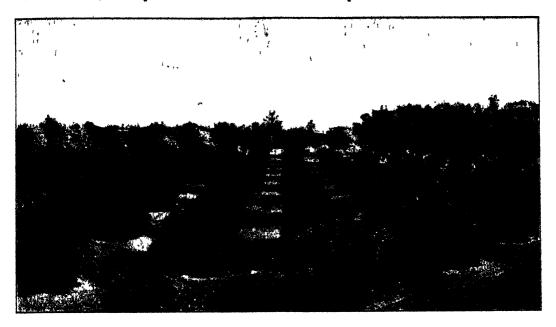
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## Citrus Decline in the Murrumbidgee Irrigation Area.

## Importance of Phytophthora Root Rot.

LILIAN FRASER, DSc. Plant Pathologist.

THE progressive decline in the condition of citrus trees in orchards on the Murrumbidgee Irrigation Area in the past eight or ten years has been shown to be due, in part, to the parasitic fungus (*Phytophthora citrophthora*) which attacks the fibrous root system, and even the main roots.

In this article Dr. Fraser discusses the factors which have led to the building up of high concentrations of the fungus in the soil, and then makes suggestions for the present management of citrus, as well as future means of controlling the disease on the Murrumbidgee Irrigation Area.

The condition of citrus trees in orchards on the Murrumbidgee Irrigation Area has become progressively more unsatisfactory during the past eight to ten years. Instead of attaining a condition of maximum productivity at the age of fifteen to eighteen years, trees tend to show signs of declining vigour. The decline is manifested in twig and branch dieback, and in decreased cropping. Very frequently the leaves are of poor colour, either distinctly yellow, giving the trees the appearance of suffering from nitrogen deficiency, or in less advanced cases, a bronze or dull green quite unlike the glossy dark green of healths foliage.

healthy foliage.

With few exceptions these earlier citrus plantings were on rough lemon stock. As a rule the decline commences in the lowest part of the block, or in any slight depressions present as the result of faulty grading. Often only a single tree is affected at first, or a few trees scattered through part of a block. On any one soil type the earliest deterioration in tree health occurs on blocks which have been carelessly watered according to present standards. The wet conditions

of the winters of 1931 and 1939 accentuated and extended the trouble, but the first symptoms had been observed before 1931.

#### Soils Subject to Waterlogging.

The properties and nature of Murrumbidgee brigation Area horticultural soils have been very completely surveyed in the report of Taylor and Hooper and the various publications from the Commonwealth Research Station. It would appear from these that most of these soils are subject to waterlogging, and that early irrigation practices erred chiefly on the side of over-application of water and over-cultivation, resulting in the development of perched water tables, consolidation of subsurface layers, some salt accumulation and a general deterioration in soil structure. The position was aggravated by periodic wet winters.

It has always been recognised that citrus requires good drainage conditions, and that the development of a water table near the root zone inevitably causes the death of the lower roots and

the partial decay of some laterals. In the past this decay has been attributed directly to the conditions of poor aeration associated with waterlogging or flooding.

It has long been felt, however, by some experienced field officers and growers that this explanation was not completely satisfactory, a few of the more obvious objections being the continued decline of trees, especially mature trees, after the unfavourable soil conditions had been improved; the delayed reaction which may occur following flooding; the occurrence of decline in soils which have never been flooded; and the difficulty of establishing young citrus in old citrus land in spite of what would normally be considered adequate soil preparation.

#### The Roots of Affected Trees.

A comprehensive examination of the roots of trees in various stages of deterioration has yielded the following information. The root systems are for the most part shallow, dependent on the nature of the soil, but are well developed, with long laterals. A very striking feature is the poor development of fibrous roots or "fibre." Most of the fibre is in the upper 6 inches of the soil, especially around the butt, whereas the lateral roots are characteristically bare of fibre or small roots for considerable lengths. Fibrous roots are at times found in a moribund condition, without the development of fresh young fibre to replace them, as normally occurs in healthy growth; or patches of rotted fibre may be found in a mass of young healthy fibre of the same age. As well as fibre loss, the smaller branch roots are occasionally found to be rotted away. In serious cases the lower roots are dead, and lesions occur on the laterals at any point from the tip to the butt number of lesions of various ages can often be found on the one root, and they appear to originate from the decay of a small lateral root. There are frequent signs of attempted regeneration of roots from the margins of such lesions. Some of these roots grow for a while and produce fibrous roots, but never attain sufficient size to replace the loss, and are subject to further rotting

#### A Parasitic Fungus Isolated.

A parasitic fungus, Phytophthora citrophthora, has been isoated from fresh young lesions on roots of all sizes, from freshly affected fibre, from the soil surrounding unhealthy trees, and, under the very wet conditions obtaining this winter, from fallen fruit under trees showing signs of decline. So far the fungus has not been obtained from soil near healthy trees, though this eannot be regarded as conclusive evidence for its absence, as methods of testing and sampling soil require further improvement.

The demonstration of the presence of this parasite provides an explanation of the puzzling features of citrus decline and of the special sensitiveness of citrus to poor drainage conditions.

Under experimental conditions the Murrumbidgee Irrigation Area strain of *Phytophthora* citrophthora has proved to be a very virulent parasite, capable of attacking all parts of young, rough lemon stocks. Healthy unwounded fibrous roots are rotted in from two to four days after inoculation, depending on the temperature. Rotting is dependent on the presence of moisture, the most rapid rotting and swiftest spread taking place in saturated soil. Very little rotting takes place in relatively dry soil and new roots are formed at a greater rate than they are lost.

In glasshouse tests with seedling stocks, rough lemon and sweet orange proved highly susceptible, sour orange fairly susceptible and trifoliata immune. Under field conditions inoculations on eight- to ten-year-old stocks showed rough lemon, sweet orange and sweet lime to be very susceptible, Cleopatra mandarin fairly resistant, sour orange very resistant and trifoliata immune. Attack and rotting of tissues took place during the heat of summer and during the coolest part of winter so long as moisture conditions were suitable.

#### A Constituent of Virgin Soils.

It is likely that the fungus is present in small amounts as a normal constituent of the soil flora of virgin soils. After planting with citrus, the growth of roots and the frequent irrigation would result in the gradual building up of the amount of fungus in the soil. The greatest amount of building up would be in those parts of the orchard where soil conditions were wet for the longest periods, i.e., in hollows or where drainage ditches were inadequate to carry off surplus irrigation water.

Most of the fungus in the surface tew inches could be expected to be killed out annually by the heat and dryness of summer. Results of sampling have shown that it is not possible to isolate the fungus from hot dry soil in summer by present methods, whereas after some months of wet weather it may be extremely abundant in the upper soil layers. It is probably present under adverse conditions as scattered resistant resting bodies, from which its spread would be very rapid once suitable moisture conditions again became operative.

#### An Annual Toll of Root Fibre.

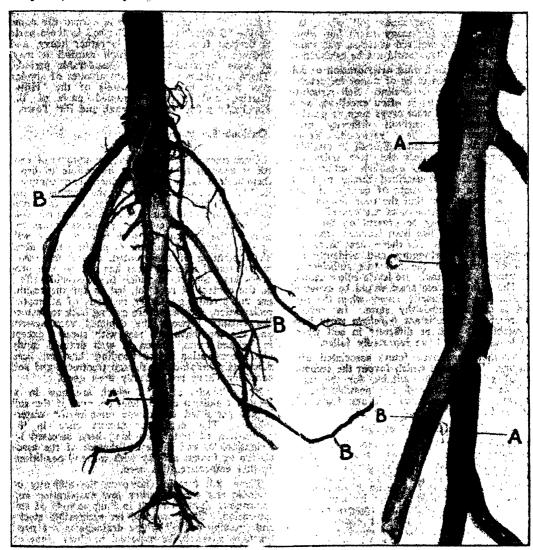
It would appear that there is an annual toll of root fibre, the amount varying with soil conditions and treatment. In the heavier soils where little lateral penetration of water takes place and dramage is slow, each irrigation period would provide suitable conditions for fungous attack. Periods of soil saturation due to rains or excessive irrigation, and the development of water tables with the accompanying fringe of saturated soil, would inevitably mean periods of considerable damage to the roots. It seems probable that young, vigorous, well manured trees can replace the small amount of fibre lost under normal conditions without suffering harm. Mature trees may not have the same replacement ability. By the time trees have reached maturity, the amount of fungus in the soil has been built up to such an extent that serious fibre loss, or even root rot, must follow any period of soil saturation. It is probably the quantity of fungus in the soil, rather than the actual age of the tree, which is decisive, since numerous cases have occurred of trees eight to twelve years old succumbing to

root rot when conditions have been specially favourable for the development of Phytophthora in the soil. The final stages of the disease come when the decay extends from the fibre to the main roots.

#### A Survey of the Area.

A survey made during June and July of this year has shown that the fungus is present throughout the Murrumbidgee Irrigation Area and in all soil types. It was found, as would be expected, that heavy soils which remain in

a wet condition for some days after irrigation, and where drainage is slow, cheved the greatest amount of root rot. This was most moved where irrigation methods had been careless. The lungus is not, however, limited to soils with a high lungus fraction. Light soils which have been over watered, or which have been temporarily flooded, or where a heavy subsoil prevents rapid drainage, show evidence of root rot. Those blocks which are at present free of trouble either are on soil of good internal drainage, or have never been flooded and have been watered with care, or are



Roots of Citeus Attacked by Phytophthera citrophthera.

Left.—Root system of a 2-year-old tree on rough lemon stock, planted in infested soil, showing poor fibre development and injury to main roots.

A .- Rotted area on tap root. B .- Rotted sections of lateral roots.

Right,-Main root from a a5-year-old orange tree on rough lesson stock.

A.—Old lesions. B.—Development of roots from the margin of an old lesion.

C .- A fresh lesion, withhle as a darkening of the bark.

still too young to show signs of disease, or like the lucerne plots at the Commonwealth Research Station, have had deep rooted cover crops, or permanent weeds from an early stage.

#### Influence of Cultural Practices.

There is some evidence that overwatering alone, in the absence of citrus, can cause an increase in the amount of fungus in the soil to dangerous levels, so that citrus can only be established with difficulty and shows earlier signs of root rot than those established on virgin land. Instances of early failure after vines are known, and in one case investigated a light sandy soil which had grown only increase for many years but which was probably heavily watered at times, was found to be infected, and citrus could not be established.

Lack of aeration following deterioration of soil structure is considered to be of minor importance in the problem of citrus decline. Soil structure in badly affected blocks is often excellent, weed growth luxuriant and other crops such as peaches can be established without difficulty after unhealthy citrus have been removed. Young citrus is, on the other hand, difficult to establish in old citrus land unless the tree holes are The failure to establish young trees resoiled. has, in the past, been ascribed chiefly to frost. An examination of the roots of certain of such young trees has shown that the root systems are poorly developed, fibrous roots are conspicuously absent and lesions may be present on the main roots. Phytophthora has been isolated from the soil around such roots. In these cases there was no question of waterlogging, and evidently the amount of fungus in the soil was sufficient to cause damage at soil moisture levels below satura-The damage from frost would be expected to be more than ordinarily severe when the root system is in an unhealthy state. In several cases trees on the resistant trifoliata stock have been established without difficulty in soil where rough lemon stocks have repeatedly failed.

Phytophthora has been found associated with salt injury. Conditions which favour the accumulation of salt would be suitable for the rapid growth of the fungus, and it is possible that in the absence of Phytophthora, injury from salt might not be so severe.

#### A Specialised Foot Rot.

Phytophthora citrophthora is very well known as the cause of collar and foot rot of susceptible citrus in other parts of the world, notably Mediterranean countries, Florida and California. Its importance as a cause of decay of roots other than crown roots, and especially its importance in the destruction of foot tibre, appears to have been overlooked. It is possible that cultural practices in those countries favoured the early development of the collar and foot rot stage of the disease, and because of their spectacular nature, the more insidious but equally important fibre loss was noglected.

The disease in the Murrunbidgee Irrigation Area is thus a specialised expression of a wide-spread trouble. Similar root rots have been observed in the heavier Murray River soils, and the fungus has been responsible for the death

of citrus on rough lemon stocks on the Dooralong flats (Gosford district) which are subject to periodic flooding. Most of the Gosford and other coastal citrus soils are, however, much lighter than the Murrumbidgee Irrigation Area soils and are well drained and not subject to root rot.

Judging from the written descriptions and from the appearance of the few remaining old trees, Phytophthora root and collar rot would appear to have been chiefly responsible for the decline of productivity of the extensive orange plantations in the Ryde, Ermington and Parramatta districts early in this century, and earned the name of the "Sydney" disease. The soil in these parts is derived from shale and is rather heavy, and because of the relatively high rainfall it may, at times, be saturated for considerable periods. There is evidence of a certain amount of similar root damage in the drier soils of the "Hills" district, and in poorly drained parts of the Hawkesbury flats at Castlereagh and Pitt Town.

## Outlook for Present Murrumbidgee Irrigation Area Plantings.

Once trees show well defined symptoms of root rot it appears to be almost impossible to bring them back to a state of full production and complete health. The concentration of the fungus in the soil is by then evidently so high that whenever soil moisture conditions are suitable, loss of roots will continue. The evil is a progressive one, the greater the amount of root lost, the less will he the capacity of the tree to produce new fibre. Trial planting of deep-rooted, dewatering cover crops around affected trees has not been in progress long enough to judge their possible effect on the control of root rot, but so far the results are not promising. Other methods of attempted reclamation, such as severe cutting back to restore the balance between the depleted root system and the top, have not met with success except in isolated cases. Even in well drained sandy soil, regeneration after flooding has not been completely satisfactory, though treatment and soil conditions have subsequently been good.

Those blocks of trees which are now in a healthy condition can be kept so, colv if the soil is not permitted to become temporarily water-logged. The need for utmost care in the application of water has long been stressed by irrigationists, and the establishment of the association of fungus activity with wet soil conditions further emphasises this need.

There still remains, however, the difficulty of periodic wet winters, when low evaporation and continuous showers result in long periods of soil saturation. Trees, worked on susceptible stocks and growing on soil where drainage is not good must, as a result, be expected to show signs of declining production at an age of eighteen to twenty years. Any condition which assists in getting rid of water from the tree root zone quickly will prolong the life of such trees. It is possible that the planting of dewatering crops while the citrus trees are still in a healthy condition might prolong their productive life. It is considered important, however, that the crops be established before decline symptoms appear,

as the aim should be to prevent the initial building up of high concentrations of the parasite in the soil.

#### The Future Outlook.

It is likely that land which has become heavily infested with Phytophthora will remain permanently unsuited for the growth of citrus on susceptible stocks. Much of the land which has already gone out of production was, in any case, quite unsuited for citrus at the outset. The amount of fungus in the soil could be reduced by cover cropping and careful treatment for some years, but it would not be eliminated, and on replanting the cycle of degeneration would again occur, most probably in an even shorter time.

Three alternatives must be faced-

I. To abandon the unsatisfactory task of attempting to grow citrus on soils liable to water-

logging and difficult to drain quickly.

2. In future developments to adopt a long term horticultural rotation, recognising the limitations of rough lemon as a stock on heavy soil. This would require orchard blocks sufficiently large to allow regular plantings to be made to compensate for degeneration.

3. To use resistant stock This seems to offer most promise for the future re-establishment of citrus in the Murrumbidgee Irrigation Area, but much work on stock selection and improvement

is required.

#### The Use of Resistant Stock.

From the point of view of resistance to foot rot, sour orange and trifoliata are outstanding. and in other parts of the world sour orange stock has been extensively used in the past because of this property. Both stocks, however, possess a number of unsatisfactory features.

Sour orange stocks have given very conflicting results in the Murrumbidgee Irrigation Area. A few of the older plantings have proved completely successful, but a number of recent attempts to establish trees on this stock have failed. It is evident that there are a number of strains, and considerable work on stock selection and on conditions' necessary for the establishment of trees

on this stock is urgently needed.

Trifoliata is also an unreliable stock. It cannot be used for lemons and navel oranges because of its variable behaviour and generally dwarfing effects. It appears, however, to be fairly compatible with Late Valencias and grapefruit, and an even stand of these varieties can be obtained. The dwarfing tendency is quite conspicuous, however, even with these, and results of stock trials at Leeton Experiment Farm conducted by the Division of Horticulture indicate that a reduction in yield may be expected of about one-quarter in the case of Valencias and one-third in the case of grapefruit over the first ten to twelve years. To compensate for this the fruit is of better quality than on rough lemon stock, hangs longer, and there is no tendency to alternate crop-ping. The differences in yield would probably gradually become less as the trees matured, but unfortunately no old trees on trifoliata are known in the Murrumbidgee Irrigation Area from which information might be obtained.

Variation in seedling trifoliata stock is great, and a selection of vigorous lines should offer a promising line of attack in any stock improvement programme. In this connection particular interest attaches to experiments now being initiated by Mr H. J. Braund, of Griffith, in the selection of trifoliatu seedlings of special vigour for stock purposes and for inarching in an endeavour to save trees not yet, or only slightly, affected by root rot, and to the work on stock selection being carried out by Dr. Joan Hearman at the Commonwealth Research Station

I have to acknowledge with gratitude the assistance in the collection of field evidence which I have received from Mr. H. J. Braund, of Guiffith, Mr. J. N. Hayden, Fruit Inspector, Leeton, and Mr. C. J. Horth, Fruit Instructor, Griffith.

## Cotton Growing in New South Wales.

(Continued from page 400.)

Queensland is attempting a vast expansion in cotton culture, largely under irrigation in areas

previously devoted to sugarcane.

New South Wales has many areas which should be suited to cotton production; in fact, cotton of high quality has been produced, for instance, on the Murrumbidgee Irrigation Area, but insufficient information is available regarding yields and costs of production to warrant recommending cotton as a payable commercial crop in any particular district. Extremely adverse seasonal conditions resulted in the failure of numerous small experiment plots sown in all likely districts throughout the State last season, but, as already mentioned, further experiments are to be carried out this year with a view to establishing the industry in this State.

In 1020, 1921 and 1922 a cotton "boom" occurred in New South Wales, mainly as the result of the operations of a company which established a ginnery at Newcastle seasons and consequent low yields extinguished the industry.

The Commonwealth Government has guaranteed a price of 12½d, per lb. for raw cotton, corresponding approximately to 4½d, per lb. for seed cotton, for the duration of the war. The guaranteed price applies to cotton of a certain standard grade, which is not difficult to attain if attention is given to clean and careful picking.

Inquiries on any aspect of cotton growing are invited by the Division of Plant Industry, Department of Agriculture, Box 36A, G.P ()., Sydney.

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## Approved Seed.

## September, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twenty-five for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied

regarding it to inquirers.

Cauliflowers.

Shorts-H. Burton Bradley, Sherwood Farm, Moorland. Cauliflowers—(continued.)

Hawkesbury Solid White—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Phenomenal Five Months--E. A. Sharp, 110 Gordon-avenue, Hamilton.

Tomatoes.

Marvana — Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Australian Earliana—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 95-Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Beans.

Tweed Wonder-H. P. Richards, "Sovereignton," Tenterfield.

Pumpkins.

Old Blue—R. C. Morandini, Box 74, Post Office, Dubbo.

## Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:—

Cauliflowers—

Hawkesbury Solid White, Nugget, Shorts.

Onions-

Hunter River White.

Grain Sorghum --Kalo,

Maise-

Leaming, Golden Superb, Golden Glow

Pumpkins-

Queensland Blue.

Grasses, etc .-

Phalaris tuberosa, Subterranean Clover (midseason), Sheep's Burnet, Lucerne.

### Discussions for Radio Listening Groups.

THE Australian Broadcasting Commission has arranged the following discussions for listening groups, to be broadcast from 8.00 to 8.20 p.m. through 2BL, 2NC, 2CR, 3LO, 3WV, 4QR, 5CL and 7/R.

September 7th. — The countryman sets the example.

September 14th. — Can I help to make factory life more cheerful?

September 21st. — What can I do for the children of my district?

September 28th. — How can I help to beautify my district?

October 5th. -- What about a community centre? October 12th.—What can I do to improve the health of my district?

health of my district?

October 19th. — What can the women at home do for themselves?

October 26th. — Should I take an interest in government?

November 2nd. — What else can I do? The listener's suggestion.

November oth. — Is the pioneer spirit rising again in Australia?

These discussions aim to explore the various ways of banding together the community for the common good, be it in war or peace time. The broadcast of 2nd November has been reserved for discussion of the best subject contributed by a listener. A prize of two guineas will be awarded to the contributor.

The A.B.C. has had prepared a booklet containing a synopsis of each talk, together with lists of suitable books on each subject. This programme and a booklet explaining how Listening Groups function are available free of charge from the Organiser of Listening Groups, Australian Broadcasting Commission, Box 487AA, G.P.O., Sydney.



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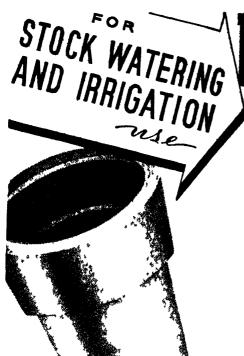
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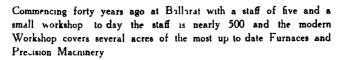
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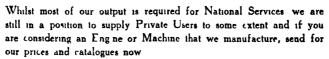


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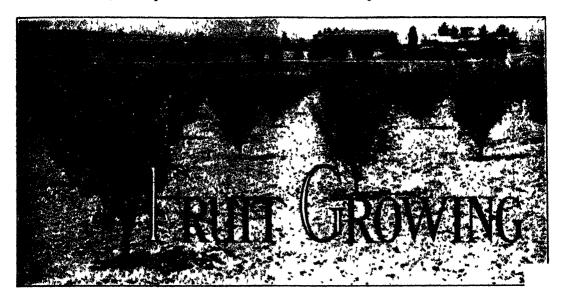
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## Re-working Apple and Pear Trees.

(Continued from page 371)

H. BROADFOOT, Chief Fruit Instructor; and L. C. WHITTAKER, Packing and Grafting Instructor.

#### PREPARING THE SCIONS.

#### Bark Side-Grafts.

WHEN cutting scions, the most obvious essential is a good sharp knife—good results cannot be expected from rough cuts. Scions should be selected according to the thickness of the stock bark, so as to avoid splitting as much as possible

The main cut on the scions should not be overlong-from 11/4 to 11/2 inches is ample, with the usual run of scions-and advantage should be taken of the slightly zig-zag nature of the wood when making the cut, to give the scion a slight heel. This enables it to be set neatly into place so as to avoid that part of the scion near the fore-end of the cut resting on the bark-lip of the stock cut, in which position only a portion of the scion-cut makes contact with the wood of the stock.

With any type of bark graft, it is advisable to remove a thin slice of bark and wood from the back of the point of the main scion cut. This results in a fine, chisel-like point which facilitates pushing the scion into position under the bark of the stock limb. This latter cut, however, need only be about 36 to 1/2 inch in length.

If necessary, the scions may be prepared several hours prior to insertion, provided they are wrapped in damp sacking or similar material, to prevent them drying out.

#### TYPE OF GRAFTING.

#### Side Bark-Graft.

The three most popular methods of side-grafting in this State are the "inverted L," the "converging cut or V graft," and the "awl or slit method," and for all practical purposes these three are ample

#### The Inverted "L."

With this method, an inverted L shaped inci-sion (thus 1) is made through the bark at an angle of about 40-45 degrees to the axis of the limb. The long cut of the L should be about 11/4 inches in length, and the shorter cut about 1/2 inch. The corner of bark in the angle of the L is raised and the scion-prepared as illustrated in Fig. 7, but with a thin sliver of bark pared from the side adjacent to the long cut of the L which is not lifted—pushed well under the raised flap of bark, and a fine tack or panel pin then driven through the bark and scion into the main limb to hold the scion firmly in position. The graft is then scaled to exclude air and moisture

In cases where the bark of the stock tree is fairly thick, it is advisable to remove a tapering slice of hark above the angle of the L so that the scion will fit nearly on to the wood of the stock. If this is not done, the scion will be squeezed against the edge of the bark underneath, and result in a weak spot in the union

The handiest and best method of making the incision in the bark is by means of a small L-shaped punch—easily made by any blacksmith.

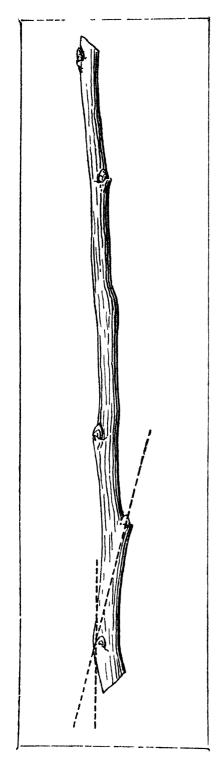


Fig. 7.—Diagram Showing Method of Cutting Scions for Side Grafts When Re-furnishing.

#### The "Converging Cut or V Graft."

This is a simple, and possibly the neatest method used. A small cut is first made at a slight angle from perpendicular, and then a second one below it, not quite parallel to, but converging slightly towards the first at the lower end—so that the space between the cuts at the lower end is just wide enough to allow the entry of the scion. This second cut may be continued as a light score of the outer bark for an inch or so, to allow the bark to expand slightly when the scion is pushed home, thus preventing the bark from splitting.

A third cut is then made to join the tops of the two side cuts. This cut is made through the bark at an angle, giving a bevelled and not a square edge, and the blunt-V-shaped piece of bark can be broken away with an upward flick of the knife, which for this work should have a rounded, sharpened end.

The scions, prepared as illustrated in Fig. 7, should be pushed home to the full extent of the cut thereon, and where the bark is reasonably

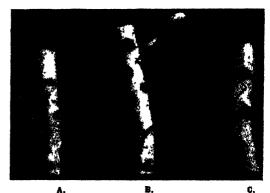


Fig. 8.—Side Bark Grafts.

A.—Converging cut. B.--Awl or slit method.

C.—Inverted L.

thick the use of tacks with this graft may be dispensed with, as the scions will be clamped into position sufficiently by the uncut bark

It is advisable, however, to use fine tacks or panel pins in thin bark. Sealing completes the operation

#### The "Slit or Awl Method."

This is possibly the quickest method used, and therefore is most popular.

A strong pointed knife may be used for making the incision in the stock bark, but by far the best way is to use a type of awl made from a large-sized packing needle. A quarter inch or so is cut from the point, which is then ground down to a chisel edge and a handle affixed to the eye end.

In practice, the chisel-like point of the needle is pushed through the bark at a slight angle, until the wood is felt. It is then pushed along the wood for a short distance or until such time as a slight leverage on it will cause the bark to open up sufficiently to allow the entry of the scion. The



Fig 9-A Re-furnished Tree Fighteen Months After Grafting

point of the scion is then inserted between the needle blide and the wood the needle withdrawn and the scion pushed home

When a knife is used for making the initial slit care should be taken to see that the seron is pushed between the bark and the wood as it is very casy, especially with thick bark to insert the seron merely between layers of bark. Thick serons should not be used for this graft, as they tend to open up the slit bark too much

After insertion, the scions are tacked and sealed although here again as with the V graft in thick bark the use of tacks is not altogether necessary as the scions are clamped down firmly by the pressure of the bark above them

#### The Oblique-Cleft Stub-Graft.

This is the simplest and quickest way of grafting small lateral stubs when refurnishing Any small limbs or shoots from as thick as a pencil to about ½ inch in diameter, are suitable for this method of grafting

The small limb to be grafted is prepared by making a slanting cut on the top side to almost half way through the limb, commencing about 1 such from the base of the twig and extending obliquely towards the main limb.

The scion is prepared by making a wedge-shaped cut, having one side slightly longer than the other. The limb is then bent downwards, thus opening the cut and the prepared scion pushed firmly into place, care being taken that the longer cut of the wedge is downwards

As with the whip-tongue graft, if the scion is smaller in diameter than the stock-piece, it should be placed to one side of the stock cut to ensure that the cambium layers of both are in contact. When the scion is in position, the limb may be released and cut off above the graft—which, being

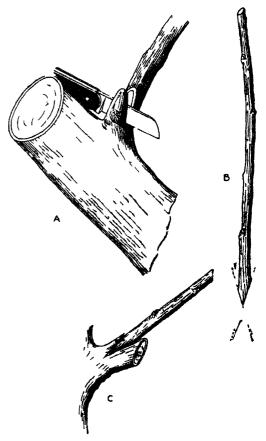


Fig 10—The Oblique Cleft Stub Graft

A—The oblique cut on the stock

B—Method of preparing the scion — Secion in position.

Scaling completes the operation

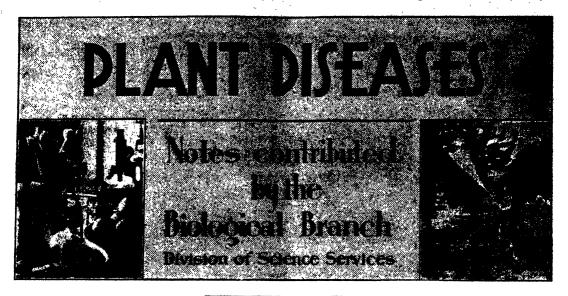
clamped into position firmly by the spring of the limb needs no tacking or tying. Careful sealing over the whole wound area completes the operation

In common with the wedge or whip-tongue grafts, this graft may be used, if necessary, before the sap is running freely

(To be continued)

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### DISEASES OF BEANS.

SINCE most of the serious diseases of beans are seed-borne, it is important that bean growers make every effort to obtain disease-free seed. The Department of Agriculture has, for some years encouraged the production of disease-free bean seed in New South Wales, mainly in inland areas, and is prepared, after arrangement, to inspect seed crops with a view to certification for disease freedom.

## BACTERIAL BLIGHT OF BEANS (HALO BLIGHT).

Halo blight is the most important disease of beans, especially in coastal crops. It causes leaf spotting and defoliation, pod spotting, stunting, wilting and death of plants. The most conspicuous symptoms are small brown spots on the leaves which, except under hot dry conditions, have a wide yellowish-green coloured border. On the pods, small dark green dots appear, which increase in size to form water-soaked patches.

The most important source of infection is contaminated seed. Under suitable conditions a few diseased plants from infected seed may be sufficient to start an epidemic throughout an entire crop. Warm weather favours the development of the disease and its spread is favoured by moisture, such as heavy dews, or periods of wet, windy

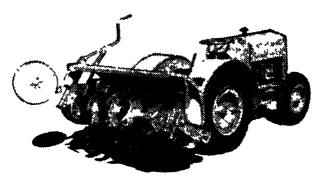
weather. It may be spread by brushing together of leaves, rain spattering, pickers, insects, &c.



Leaf Showing Halo Spots Caused by Bacterial Blight.



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Pods Showing Water-soaked Areas Caused by Baccerial Blight.

#### CONTROL MEASURES.

Where possible use "Departmentally recommended" seed. If infected seed must be used it should be kept for one or two years before sowing. This will rid it of much of the infection.

In the production of beans for seed purposes, precautions must be taken to reduce the spread of the disease if it appears, by the removal and burning of all infected plants. This is only of value if the crop is lightly affected, and must be carried out frequently and thoroughly, especially during the early stages of growth.

Crops sown in summer when wet conditions are less likely to be experienced during early growth, are less subject to blight than spring- or autumn-sown crops

Picking or cultivating should not be done during rainy weather or when plants are wet with dew.

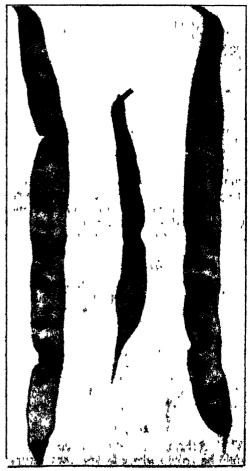
Burning of diseased plants at the end of each season, and crop rotation will minimise the risk of infection from diseased material in the field.

#### Mosaic.

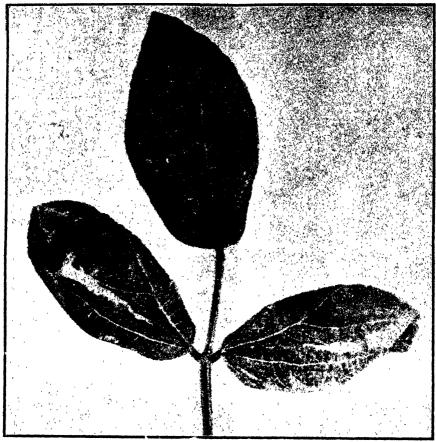
This is a virus disease transmitted from diseased to healthy plants by aphids. It is not usually sufficiently prevalent to cause serious losses, but it is of importance in crops grown for seed production, as a high percentage of the seed from plants showing mosaic symptoms is infected. Symptoms are the mottling and puckering of leaves, and downward curling of margins. The type and degree of mottling and distortion vary considerably with variety, growth conditions and age at which infection takes place. Plants infected at an early stage are stunted and crop poorly.

#### CONTROL.

Seed free from infection should be used where available, and seed growers should pay special attention to the removal and



Pods Affected with Anthraenous



Leaf Showing Mottling and Cupping of the Leaflets due to Mosaic.

burning of infected plants. As mosaic usually spreads most rapidly in the spring and early summer when aphids are most abundant, seed growers are advised to plant their crops as late as possible to avoid infection.

#### Anthracnose.

Anthracnose is first apparent as a blackening of portions of the veins on the undersurface of the leaves, and the leaf tissue on each side of the affected veins may wither and die. Dark brown or black, sunken markings are produced on the stems, often causing death in the seedling stage. Spots are also produced on the pods and are of variable size, sunken, dark-coloured and often with a pink-coloured central area.

#### CONTROL.

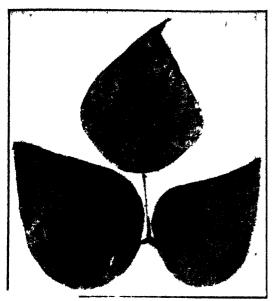
The resistant variety Tweed Wonder should be grown where losses from anthrac-nose are to be expected.

If susceptible varieties are grown, crop rotation and the early removal of infected plants are recommended, as in the case of Bacterial Blight.

#### Fusarium Root Rot.

This disease is important in some sandy coastal soils, and is most destructive in warm, dry weather. Infection takes place at an early stage, and the first symptom is a reddish-brown discoloration of the tap root and lower part of the stem. This may be followed by a partial or complete destruction of the root system. New roots are sometimes formed above the point of infection, enabling the plant to make a temporary recovery.

Foliage symptoms are usually slow to develop. There is a gradual stunting, the leaves turn yellow, and in extreme cases may wilt and die.



Angular Leaf Spot

#### CONTROL.

When once introduced into the soil, the causal fungus will persist for a very long time. Crop rotation will not, therefore, climinate the disease, but it will assist in keeping it in check.

The variety Stayley's Surprise is very susceptible and should not be grown except in soil known to be free of the disease.

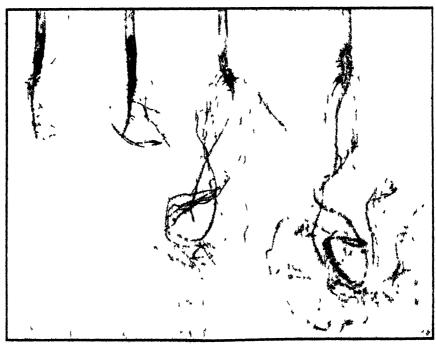
Other varieties commonly grown—Tweed Wonder, Canadian Wonder, Hawkesbury Wonder and Brown Beauty—are fairly resistant, and usually do not show more than a slight reddening of the tap root when infected.

#### Angular Leaf Spot.

Angular leaf spot occurs on most coastalgrown crops during the late summer and autumn. It appears as small, angular brown spots, and is usually confined to the older leaves, rarely causing serious damage Greyish-black spots are occasionally produced on the pods, and these can be distinguished from anthracnose spots by the fact that sunken lesions are not formed

#### Scald Disease.

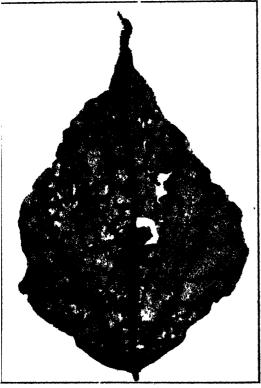
The term "scald" has been applied to a non-parasitic disease, encountered so far only in the Gosford-Wyong district, which is characterised by a discoloration and death of portions of the leaf tissue of affected plants. Diseased plants are stunted, and their yield is poor; and if many plants are affected crop failure can occur



,Root Systems of Beam Affected with Fusarium Wilt. Healthy plant on right.

The first symptom of scald is a collapse of tissue between the main veins and along the edges of leaflets. The collapsed tissue is at first a light, greenish-brown colour, but later it becomes yellowish-brown. Following this, there may be a withering of the tips, or edges, of leaflets or of whole leaflets, giving a "blighted" appearance to plants.

The cause of scald is still somewhat obscure, but some interesting associations connected with the disease have been deter-



Scald Causes Yellowish-brown Dead Areas
Between the Main Veins.

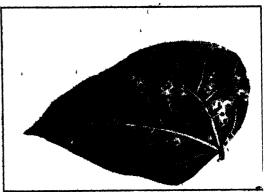
mined The disease is associated with seed raised in soils of high acidity (pH 4.2 to 5.0) and in turn planted in highly acid soils. Similar seed, if planted in fertile soils of low acid content, will give vigorous and productive plants. An interesting feature,

determined by Dr. N. H. Parbery, is the high manganese content of scalded plants, this being several times that of healthy plants.

Scald may be avoided on land known to be liable to the disease, by planting seed raised in inland areas, such as Dubbo or Wellington, or in non-acid soils. Heavy liming of the soil with dolomitic lime some months before planting is worthy of trial in areas in which this disease occurs.

#### Rust.

Owing to the high degree of resistance shown by dwarf varieties, rust is confined almost entirely to climbing varieties, and is most severe towards the end of the season. It is thus of more concern to the home gardener than to the commercial grower. Practically all of the injury results from leaf infection. The first symptom is the de-



Leaf Rust on Epicure Bean.

velopment of small pale yellow spots on the leaves. The surfaces of these spots soon become raised and later break, exposing powdery brown masses of rust spores. When infection is heavy the entire leaf yellows and dies prematurely.

#### CONTROL.

As soon as the first sign of rust appears, dust the plants with a mixture of equal parts by weight of sulphur and hydrated lime. This should be repeated each week.

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# 178ECT PESTS. Notes contributed by the Entomological branch.

#### THE VEGETABLE WEEVIL.

(Listroderes obliquus.)

VEGETABLE growers are warned that adult vegetable weevils will now become numerous, and are again reminded of the necessity of adopting control measures before serious damage has been caused to their crops. Infestation is likely to occur amongst crops such as potatoes, carrots, tomatoes, turnips, beetroot, lettuce, etc.

The adult weevils commence to emerge from the soil during August and will become most numerous during October and November. These adults, which feed at night only, hide beneath the soil or under rubbish during the day, and may be found in numbers about the base of each plant. In addition to feeding voraciously on the foliage of the plants, root crops such as carrots, parsnips, turnips, etc., may also be devoured below ground and destroyed.

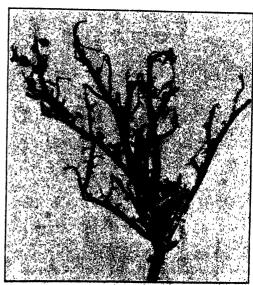
#### Precautionary Measures.

As a precautionary measure against damage by the weevils, any ground that has been cleared should be baited after an interval of several days, either with poisoned foliage or poisoned bran mash, before planting out. This procedure is particularly important where any ground is known to have been infested with the larvae or if there is suspicion that it is infested.

It should be remembered, also, that the destruction of weeds late in the season will cause the weevils to migrate from the dying weeds or from the soil into cultivated areas.

#### Control Measures.

Where crops such as carrots, potatoes, tomatoes, etc., the foliage of which is not used as food, are infested, the weevils may be controlled with an arsenate of lead spray or dust.



Potato Plant Damaged by Vagetable Weevil.

The Spray.

Lead arsenate powder 4 oz. Water ... 5 gallons.

The Dust.

Lead arsenate powder .. I lb. Kaolin or hydrated lime .. 4 lb.

Where crops such as lettuce, spinach, etc., which must not be contaminated with arsenicals, are attacked, control of the weevils may be obtained by dusting with a mixture of equal parts of pyrethrum powder and kaolin, or else a bait of chopped leaves poisoned with lead arsenate must be used. For the poisoned foliage bait, chopped leaves of mallow, waste leaves of turnips, lettuce, etc., which have been either dusted or sprayed with lead arsenate, may be used. These should be scattered over the area late in the afternoon.

The formula for the poison bran bait is as follows:—

Bran		24 lh.
Salt		½ lb.
Sodium arsenite		½ lb.
or Paris green	ı	t lb.
Water		$\dots 2\frac{1}{2}$ gals.

The sodium arsenite should be dissolved in the water, the salt then added and the mash prepared. If Paris green is used, it is mixed dry with the bran and the mash prepared with the water in which the salt has been dissolved. This bait should be broadcast and partly worked into the soil late in the afternoon.

#### Cutworms.

(Noctuidae)

When vegetables are planted out during September and October, in ground that was



Young Plant Cut Off at Ground Level by Cutworm

Larvae [After Gibson.

covered with weeds and grasses during winter, damage may be expected from cutworms which have been breeding there.



Cabbage Plant Destroyed by Cutworms. [After U.S. Dept. Agric

It is essential, therefore, that before planting out in such areas growers should adopt precautionary measures similar to those recommended for vegetable weevils. If this is not done losses to growers will probably occur, as the young plants, when planted out, may be cut off at ground level and destroyed by the cutworms, which feed at night and hide beneath the soil during the day.

## The Green Vegetable Bug. (Nezara viridula.)

\_\_\_\_\_

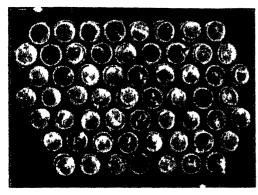
GREEN VIGETABLE BUGS, which hibernated during the winter amongst the leaves of old plants or in other sheltered positions, will now be commencing to lay their eggs on various plants. A close watch should be kept for the adults, and hand-collecting of both the adult bugs and their egg-clusters (on small areas), or control dusting of the young bugs, should be undertaken as soon as possible. Their destruction early in the season will greatly reduce the amount of infestation later, their period of greatest abundance being February and March.

Each egg-cluster consists of from forty to eighty eggs, which are laid in regular parallel rows and firmly glued together and to the surface upon which they are laid. They are pale-yellowish when first laid, but as the embryo bugs develop the eggs become pinkish and gradually darken, until just before hatching they become reddish-brown in colour. As many as four egg-clusters may be laid by an individual female. The eggs usually hatch in from five to eight days and

the empty eggshells resemble small glassy

cups.

The young bugs usually remain clustered together close to the eggshells for the first day or two, but later disperse over the plants and after casting their skins five times reach the adult winged stage. The adult is a green shield-shaped insect, about five-eighths of an inch in length. Both the young and adult bugs obtain their food by sucking the plant juices. The life-cycle from egg to adult occupies from about five to eight weeks.



Egg Cluster of the Green Vegetable Bug, Showing the Circular Caps Pushed Off by the Young Bugs when Emerging.

#### Control Measures.

There is no insecticide yet available that will readily destroy the adult bugs without injury to the plants. The immature bugs may be dusted with pyrethrum powder mixed just before use with an equal quantity of 2½ per cent. nicotine dust. The surface of the soil around the plants should also be dusted in order to treat any bugs which may have dropped to the ground.

Hand-collection of the adults and their egg-clusters (on small areas) is effective.

Clean cultivation is also an important factor in their control.

They are now largely controlled by an introduced wasp parasite, the larvae of which develop within the eggs of the bug.

#### "Dicky Rice" Weevil.

(Maleuterpes phytolymus.)

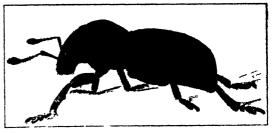
CITRUS growers who have not yet undertaken control measures for the dicky rice weevil, in those parts of the coastal area where this pest occurs, are urged not to neglect the banding of their trees with a tree-banding mixture to prevent the weevils ascending the trunks of the trees. Where this is not done the trees may be seriously miured.

The adult weevils commenced to emerge from the soil during August and emergence will continue throughout September and October.

The fruit is attacked soon after it sets, and the greater part of the injury is caused during the following three months. Where the weevils are numerous as much as 70 per cent. of the fruit may be badly disfigured. Foliage injury is more serious on young or re-worked trees.

#### Control Measures.

The control recommended is to band the trees with a sticky tree-banding material. This may be applied with a flat stick so as to form a ring about 2 inches wide and from one-sixteenth to one-eighth of an inch in thickness around the trunk. It is advisable to apply the band as high as possible on the trunk of the tree below the main branches. From time to time the surface should be freshened by rubbing, or, where necessary, by the addition of a little more material. The lower branches should be



The "Dicky Rice" Weevil.

pruned so that they do not come within 6 inches of the ground, and all weeds and grass beneath the trees should be removed.

Where the trunk is not exposed to the direct rays of the sun, the banding material may be applied directly on to the bark; otherwise it is advisable first to tie a strip of grease-proof paper around the trunk in order to prevent possible bark injury.

If the trees have already become infested before banding the trunks, many of the weevils may be dislodged by jarring.

#### Cherry Aphids.

(Myzus cerasi.)

Towards the end of this month will be the time to apply the first of the spring sprays—the "pinking" stage spray. This spray is especially important where the "dormant" period spray has not been given to the trees to destroy the overwintering eggs of the cherry aphid.

The hatching of the eggs commences from about the beginning of August and continues until about the middle of September, and as the minute first-stage aphids make their way to the developing buds it is essential that the "pinking" stage spray should be applied to control the aphids before they are able to shelter within the opening buds.

The spray recommended is-

Where lime-sulphur is being used as a fungicide, the nicotine sulphate may be used in combination with it, but then the soap should not be added. Calcium caseinate, at the rate of I lb. to 75 gallons of solution, may be used as a spreader instead.

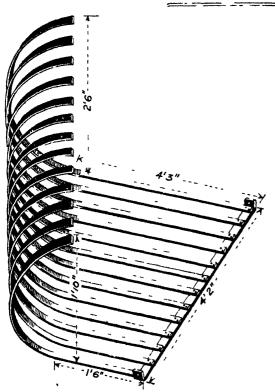


Diagram Showing Construction of the Mower Rake.

#### SIDE-DELIVERY MOWER RAKE.

#### A Correction.

IN the June issue of the "Agricultural Gazette" a description was published of an easily made side-delivery rake mower attachment—an implement which has been found of great value in the saving of labour when harvesting green fodder crops.

In the description, the weight of the rake was, in error, shown as approximately 3 cwt., instead of 34 cwt., and some farmers may, as a result, have refrained from attempting to make the rake, considering it too heavy for attachment to a mower.

Each finger of the rake (shown in the attached diagram) is 4 inches longer than the preceding one (not 6 inches as stated in the June issue). If the shortest finger is 3 feet 10 inches long, then the longest will be approximately 8 feet long, where the rake is for use with a 4 feet 6 inch mower. Since there are thirteen fingers in all, they will need to be spaced at 4 inches centres.

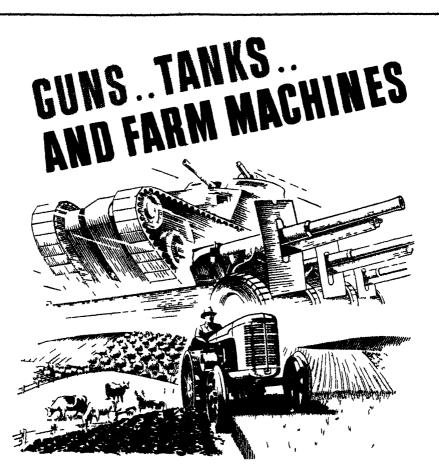
#### Put Binder Canvases In Order Now.

Now is the time to examine binder canvases, with a view to repairing or renewing them prior to harvesting. Damage will usually come under one or more of the following headings. Holes, either torn or worn; weakened duck, caused by decay or damp storage, warped or broken slats; broken straps or buckles; missing straps with the rivet holes in the canvas torn

The local farm machinery agent has the wooden slats and rivets, and he may have the straps and buckles. He may also have some old canvas to use for patches, or he may help you to procure it in the neighbourhood. This emergency may call

for some co-operation in the division of used canvas for patching. The local agent may take the job of doing all the repair work, or there may be in your own township or nearby town, a furniture store, a saddler or a bootmaker who can sew and patch and rivet.

The important thing to do, to help the Nation's war effort and conserve supplies of new canvas-materials, is to put your binder canvases in working condition now, and then make sure to dry them between usings. And don't forget, after harvest, to dry and store them—they are precious, and may become more so.



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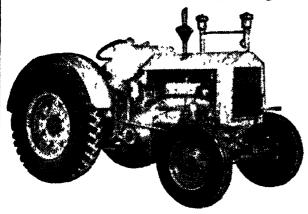
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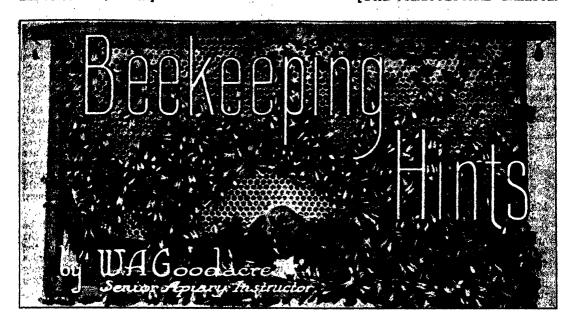
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#### PREPARATIONS FOR THE COMING SEASON.

AS a result of the State-wide, beneficial rainfall, which has produced an abundant growth of pasture and other ground flora, the prospects for progressive spring work in New South Wales apiaries are much brighter than have been experienced during the past few years.

The supplies of nectar and pollen from these sources should provide the necessary stimulation for intensive brood-rearing so necessary for the provision of full colony strength to enable future

maximum seasonal production. It is anticipated also that artificial increase to replace autumn and winter losses will be possible earlier than usual.

Owing to the shortage of labour on most farms, it is more important than usual that all seasonal operations be carefully planned. The building-up of the apiary must be completed before the commencement of a heavy honeyflow, as undivided attention must be directed to production of honey and beeswax.

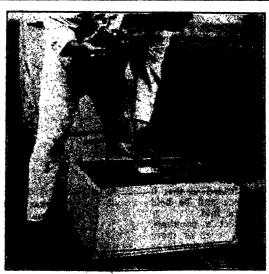
#### Savings by Co-operation.

Another important factor which should assist in making the

best of production is the co-operation of beefarmers during the busy season.

In one inland district we already have an excellent illustration of the value of co-operation. Several migratory bee-farmers, operating about 3,000 hives between them, are working in a group and assisting each other on every possible occasion. During extracting time, even one day of concentrated effort to assist one of the party who has not been able to keep up with his work, has prevented loss of production, and has relieved the par-

ticular bee-farmer of considerable anxiety. Co-operation also effects a considerable saving in motor fuel, as several of the party travel together in one vehicle when surveying prospective country and securing sites for the establishment of their apairies, and during visits to the various farms ordinary seasonal inspection and manipulation service. Even where a producer-gas unit is installed there is need to conserve for special purposes the meagre amount of petrol supplied.



Introducing a New Queen.
Using the cage in which it was mailed.

#### Artificial Increase to Replace Losses.

Colonies from which new stocks are to be drawn to provide artificial increase to replace losses should be well built up in strength, and should show progress in brood rearing. It is necessary also to provide young queen bees or well developed queen cells for placing with the young colonies immediately they are formed. Where the losses occurred as a result of adverse conditions, and when the lives and combs previously used have been properly stored, accommodition for the new stocks will create no problems.

## THE INFLUENCE OF BEE-KEEPING.

Mk L H Sweetser, writing in the American Bee Journal, states All living things calculated for human use, except the honey bee are destined for probable slaughter by their The farmer cannot carry on his vocation without taking life, even his wornout milch cow is sliced up, and his faithful horse often ends its days as meat meal for the balanced ration in a poultry yard Beekeepers carry on one of the gentler pursuits of life. Their vocation tends to make them good citizens. They have been inoculated with sympathy and understanding, a love of time nature undefiled and they are always found amongst the respected people of the neighbout hood

lo ensure the early establishment of the young colonies at its essential that they be supplied with the best worker brood combs. The experienced bee farmer will find no difficulty in raising the required number of queen cells, others may have arranged with queen bee breeders for early supply of young well bied queens.

In miny cases however owing to the most capible member of the family having been called up for military service the apility is left in the care of another member whose experience is very limited. Fo make up for losses under these conditions it will be necessary to depend on some very simple plan to provide queens even though it may impose a little extra strain on the bees.

#### A Simple Method of Increase.

A popular and simple plan for making increase is as follows—Select from the stored material a single store. hive with a good fitting cover and bottom board and place in it one fairly well filled comb of hones and two selected, empty brood combs or frames fitted with full sheets of comb foundation. Then cut a piece of wire cloth 1½ inches wide to fit neatly the full width of the hive entrance. This is slightly folded so that it may be pressed into the entrance and be held firmly by the spring created by the fold,

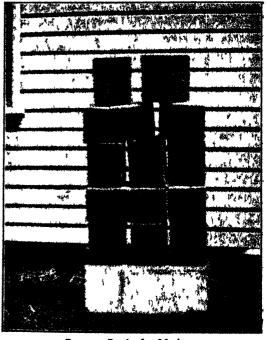
The next procedure is to select a populous, well bred colons of bees having seven or more of its combs well filled with brood. It should be observed that eggs are present in each comb, if not, this omission may be remedied by the exchange of a comb or two from other selected.

stock

The queen should be located during the inspection and placed directly in the prepared screened hive together with a frame of brood well covered with bees one empty frame or comb being removed from the nucleus to fill the position previously occupied by the frame of brood and bees in the populous hive. The nucleus now contains three frames which should be placed in the following order —The empty one against the wall of the hive, the frame of broad and bees next, and the comb of honey on the outside cover is placed on and the nucleus carried carefully to the stand it is to occupy, and the bees are left screened-in for two full days. When removing the scicen, use a little smoke to prevent a rush of bees and contract the entrance, which should be on the side of the hive occupied by the bees, to about I inch in length

After ten days the populous hive should be examined and no doubt it will be found that the bees have built queen cells on five or six of the brood combs a further number of nuclei colonics may then be made up in the manner already described the queen cells on this occasion taking the place of the queen

It is desirable to return the old queen with the frame of brood she occupies in the nucleus to the parent hive. The small colony is then



Beeswax Ready for Market.

A useful contribution to the war effort

re-established by giving it a frame of brood and bees with a queen cell. The writer has observed a successful establishment, under favourable conditions of twenty-five nuclei colonies from five populous hives when this plan has been adopted.

#### Increase when Queen Boes are Available.

When queen bees are received from a queenrearing apiary, it is usually advisable to form single nuclei with the old queens from separate hives, and introduce the new ones to the full colonies. A small colony is very contented when established with its own mother, and a young, well-bred queen will give of her best in the wellpopulated parent hive. A queen may be introduced in the cage in which she is received by mail, by following the directions on the back of the address label; the position of the cage over the brood frames for introduction is shown in the accompanying illustration (page 433).

#### Efficient Beeswax Production as a War Effort.

It is important for the war effort that every scrap of beeswax be saved during the coming season. Merely to boil cull combs in a sack, will produce less than half the wax; some pressure must be applied to secure satisfactory results.

#### The Role of the Small Bee-keeper in the War Effort.

Throughout the State, amongst men and women of almost every walk of life, there are those who are engaged in bee-keeping in a small way. It is opportune at this time, writes Mr. H. Graham Smith, Apiary Instructor, Hawkesbury Agricultural College, to consider what contribution these beekeepers may make in the present emergency. Amongst this section of the bee-keeping community there exists that which is most important—a considerable amount of knowledge of bees and skill in bee-keeping practice, plus a considerable stock of bees and bee-keeping material, which, if economically utilised, would render a service of value at a time when the ranks of full-time honey-producers have been thinned by the application of man-power emergency measures.

#### Harnessing the Scattered Resources.

Bee keeping is a peaceful avocation, and those engaging therein as amateurs, usually do so for recreational purposes only, with little or no thought of their hobby having any place in the major issues of the day. It requires but a moment's thought to realise that the skill, energy and capital investment of the small beekeeper may subscribe in considerable measure to the war effort, when every pound of food produced is equally important. In these days of stress and strain such a holdy may be regarded as an asset.

The amateur beckeeper will profit by brushingup his knowledge of hive manipulation and apiary practice. He is already aware that there is more in bee-keeping than the setting out of bee hives and placing bees in them, and at a later date calling to collect the honey crop. Since each colony is an individual community, differing both in temperament and in response to external influence and management, there is scope for the application of much skill in hive manipulation, particularly in the preparation of colonies for the flow. It is beyond the scope of these notes to supply this information, which may be obtained from the recently revised handbook, "Bees and Honey," obtainable from the Department of Agriculture, Box 36A, G.P.O., Sydney, price 2s. od., postage paid.

One suburban amateur this season produced 650 lb. of honey from six colonies, and increased the number of his colonies to thirteen; a very good performance. Many small apiaries are capable of producing similar returns, since it is a recognised feature of bee-keeping that, where colonies are well managed, small apiaries tend to produce higher average yields.

#### The Economic Aspects Must be Considered.

These remarks relate strictly to the utilisation, on a more extensive scale, of skill and material in hand, with only such expansion as spare apiary equipment on hand, and not already in use, will permit. To go beyond this, by purchasing new equipment, should as far as possible be avoided, since difficulty is already being experienced by manufacturers in keeping up necessary supplies to commercial bee-farmers, upon whom the major job of honey production depends.

Any expansion of the industry at this stage by newcomers is deprecated on the ground that it would make undesirable inroads upon the already

limited supply of new material.

#### Beef Cattle Industry.

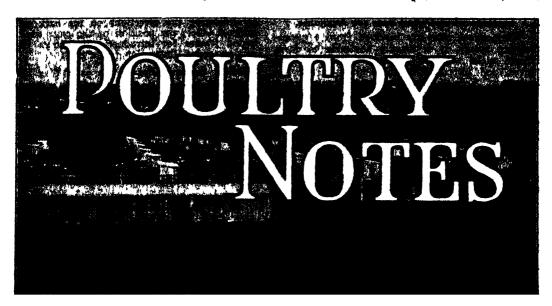
(Continued from page 409.)

Beef breeders have, for the most part, adhered to Form A, whilst dairy cattle breeders have universally adopted Form B. There is, however, a tendency for many beef cattle breeders to change over to Form B. A more detailed history sheet is provided on such a form.

The value of a pedigree is in the detailed information that it supplies, and the benefit derived from such information depends on the knowledge on the part of the breeder of the characteristics of the animals recorded in that pedigree.

Breeders often maintain family names in the nomenclature of their animals. This often proves to be a good selling factor, but it very often deceives the uninitiated. The foundation beasts whose names appear in the pedigree are at times so far removed as to have very little influence on the breeding.

Pedigrees must be a true history of a heast. To ensure that such records are correct breeders must identify and record animals as soon after birth as possible. For this purpose there is no better method of identification than by the use of the tattoo.



#### LATE HATCHED CHICKS UNSATISFACTORY.

MANY poultry farmers who did not commence hatching operations or purchase chickens as early as usual this season owing to uncertainty as to future prospects, now appear to be attempting to make up for deficiencies by arranging for chickens in October. This course will, in most cases, lead to disappointment and loss, as it is only where these late hatched chickens can be reared on fresh ground and under good conditions that they are likely to prove successful. Even given good conditions it will be found that, although they may thrive reasonably well during the early stages of growth, they will remain more or less at a standstill during the hottest part of the summer, and consequently many will not come into payable production until late next winter. In cases where these late chickens have to be run over the same ground as the earlier ones they will mostly prove a liability, as mortality is usually much higher and the birds do not thrive nearly as well as those hatched a month or so earlier.

Although increased production may be needed to meet the growing demand for eggs for both local consumption and export, it is futile to depend upon chickens hatched after September to add to flocks. Any attempt to raise more chickens than the equipment can properly carry will also lead to losses and poor development.

The wisest course, therefore, is to raise only the number of chickens which can be put through without congestion during any stage of rearing up to maturity, and even overstocking the adult birds will lead to various ailments and lowered production.

#### Care of Chickens in the Spring.

With the advent of warmer weather there is a tendency for poultry farmers to neglect

the brooder temperatures owing to the mistaken idea that the chickens do not require the same warmth as in the colder weather. This leads to much trouble among the later chickens. As a matter of fact, owing to the fickle nature of the weather usually experienced at this time of the year it is necessary to give closer attention to the management of the chickens, as there is often a wider variation in the temperature between daytime and night, as well as sudden cold snaps after a spell of warm weather, and this renders the rearing of the later chickens more difficult than during the uniform cold weather of the winter. Therefore, it is advisable to keep the heating system working throughout the day so that in the event of a sudden cold change

sufficient warmth can be provided without delay.

During the warm weather more ventilation should be allowed both in the brooders and brooder house, as this in an important factor in maintaining the health of the chickens.

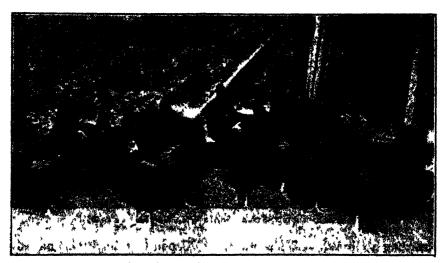
#### Don't Remove from Brooders Too Soon.

A common practice which leads to trouble among the chickens is that of removing them from the brooders a week or two younger than usual as soon as the warm weather commences. Then when a sudden cold change occurs they suffer a severe setback through packing together for warmth

The safest course is to follow the same procedure as in the early part of the season;

specially constructed crates where they cannot sit comfortably they can be returned to their pens in three to four days.

A suitable type of crate is one which has a slatted bottom with the battens about 3 inches apart. The sides can be made of slatted battens or wire netting, but the front should be slatted so that the feed and water troughs can be fitted to the outside. The top should be covered with iron, and it is a good idea to have a flap made of iron or wood hinged to the back so that it can be propped up in the hot weather to keep the birds cool or shut down in cool days for protection against winds. If the crate is placed in a pen it is necessary to fit a cover over the feed and water vessels to prevent other birds getting at them.



Australorpe at Suitable Age for Caponising.

by so doing much of the unthriftiness usually seen among the end-of-the-season chickens will be obviated.

#### Handling Broody Hens.

As the warmer weather sets in the number of broody hens among the heavy breeds increases, and unless they are handled in a systematic manner much loss of production occurs. If the hens are allowed to remain in the pens because they fly off the nests when the eggs are being collected they become thoroughly broody and take much longer to come back into production when they are finally removed from the pens, whereas if they are caught as soon as they show signs of broodiness and are placed in

In dealing with the broodies the best course is to shut the door of the house before collecting the eggs and then catch any which fly off the nests.

The broody hens can easily be distinguished from those which may be on the nests to lay, by the ruffling of the feathers around their necks, and clucking

Each day's broodies should be placed in a separate compartment so that they can be returned to the pens in about three days. After this period very few will return to the nests, provided that they have been caught in the early stages of broodiness.

It is much more satisfactory to provide crates such as described for the purpose rather than to place several days' broody hens in one pen, as in this case it is difficult to distinguish the birds which have recovered from broodiness.

#### Caponising Cockerels.

Recently a number of inquiries have been received regarding caponising. Below are outlined some of the factors involved in producing capons.

In the first place, it is essential that the operation be performed before the birds commence to show much comb development, which would be between eight and ten

nine months old to derive any material benefit from caponising. Thus the cost of feeding is a factor which has to be taken into consideration, and unless a special outlet is available for capons at prices higher than obtainable for cockerels, there would be no profit in them. Under present conditions there is no regular demand for live capons in the market, and the only way in which they could be profitably disposed of would be by selling them dressed, but as previously mentioned, a connection would have to be established before undertaking the production of these birds.



Australorp Capons Seven Months Old, Weighing 61 to 81 15

weeks according to breed. The necessity for selecting birds for caponising at such an early age creates a difficult problem for those who require to reserve a large number of stud birds. Again, there would be little advantage in caponising the early hatched cockerels, as they usually command good prices in the market if well-reared and kept to a suitable age. On the other hand, it would be useless to caponise late hatched birds, as they would take too long to develop into marketable birds. Even the early and mid-season hatched birds would have to be kept until they were eight to

(aponising might be an advantage for those raising a few table birds for home consumption, as the capons could be kept for killing as required without becoming "staggy"; they are not quarrelsome and would not be a nuisance to neighbours through crowing.

To perform the operation it is necessary to have a special set of instruments, and these are usually obtainable from suppliers of poultry requisites at prices ranging from £2 to £5. A little practice is necessary to become proficient in carrying out the operation.

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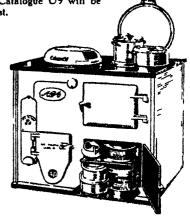
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#### THE ENEMY LISTENS

Don't let the Fighting Services down by passing on secret information in your possession

**GUARD YOUR TONGUE** 

When fowls become limp, completely paralysed and die, botulism may be suspected as one possible cause . . . .

## Botulism in Poultry.

T. G. HUNGERFORD, B.V.Sc., H.D.A.

CASES of botulism in poultry come under notice in country districts occasionally, and, due to the nature of the condition, it is probable that a large proportion of outbreaks remain undiagnosed.

One typical outbreak occurred recently in the Windsor district where approximately thirty birds died out of two hundred and fifty. The birds had access to giblets which were putrid as the result of being left from Thursday until Sunday in a copper. Twenty hours after feeding, some birds were showing symptoms, and more became sick in the next sixteen hours. Forty-eight hours after feeding, a great number were lying about, some being paralysed and some dead. All had either recovered or died within sixty hours after feeding.

Soon after symptoms of paralysis were first noted the owner brought several birds for inspection. As they were very heavily infested with head lice, this was suspected to be the cause of the trouble. When, however, deaths continued at an alarming rate, an investigation on the property was instituted and the real cause ascertained. It is noteworthy that the mere submission of a bird or two for examination is often mis-, leading.

#### The Cause.

The cause is a microscopic germ, Clostridium botulinum, which grows in the absence or deficiency of air (oxygen). This germ produces a poison or toxin of high potency, and when this is eaten with the food, symptoms of poisoning occur. It is the same type of disease as ptomaine poisoning in humans.

All birds or animals which eat rotting organic matter infected by the germs and containing poison produced by these germs may be affected. Wild birds, fowls, turkeys, geese and ducks, have all been affected in this State.

#### Infectivity.

The infection is not transmitted from one bird to another, but only those which have access to contaminated food become affected After the affected birds recover, they do not remain "carriers" to transmit the disease. The disease may be transported mechanically by any animal or bird which transports material infected with the germ, and its toxin. Maggots feeding on infested rotting carcases may carry the germ and its toxin, and such maggots when pecked up by the bird may produce symptoms of the disease.

Cases have occurred where wild birds have been killed by drinking water in which decomposing carcases of birds shot by sportsmen were present.



Botulism in Fowls in Windsor District.

Due to eating putrid giblets All three fowls were unable to stand. Note gasping respiration of fowl in background, the flaced drooped wing of the bird in the foreground, and the drooped neck of the other fowl.

Recovered birds have a considerable resistance to further infection and intoxication.

#### Symptoms.

Strictly speaking, there is no "incubation" period, but only the lapse of time between the taking in, and action of the toxin. It varies, according to the amount and potency of the toxin eaten, from twelve to forty-eight hours after feeding.

Symptoms are as follows:—The bird appears drowsy, is disinclined to move, droops its head, and later rests the head on the ground. The neck may be coiled over, or in extreme cases lies straight along the ground in a flaccid state. In such extreme cases this symptom is characteristic, not occurring in any other disease of fowls. The wings and the legs may suffer loss of muscular power, or may be affected with complete paralysis. In most cases a small amount of mucoid saliva dribbles from the mouth, and there may be a watery greenish diarrhoea.

#### Post Mortem Appearances.

There are frequently no abnormalities. In some cases the pericardium (the sac surrounding the heart) is distended with yellowish fluid and there may be pin point haemorrhages in the muscle of the heart. Sometimes there is reddening, or perhaps inflammation of the small intestine; this is the exception, rather than the rule. A careful search will usually reveal some rotting organic matter in the crop or stomachs, such as a piece of bone, mouldy food, or, as in the case mentioned, feathers which have been attached to the rotting giblets when they were eaten.

#### Differential Diagnosis.

The widespread sudden occurrence of the symptoms and the nature of the disease point to this disease and no other. The history of feeding on rotting or tainted food materials, is significant. Isolated cases when one bird dies from feeding on a rotting carcase may thoroughly confuse the diagnostician. For confirmation of the diagnosis sick birds, whilst still alive, should be forwarded to the laboratory, together with

recently dead birds, and some of the suspected food material. Gut contents should also be dried and forwarded if there is difficulty in sending the other specimens.

#### Control.

Giblets or other meat available, should not be allowed to decompose before feeding to poultry. Old bones, putrified rabbit carcases, and similar material have caused



Birds Affected by Botulism.

Note sleepy, relaxed condition. Bird in foreground was unable to raise its head.

many mortalities. Mouldy food left in filthy feeding troughs may also result in the death of odd fowls.

This condition is not often of economic importance to the commercial poultry farmer. It is described so that the casual losses due to botulism in poultry which sometimes occur in country districts may be recognised and further losses avoided. Deaths in some outbreaks have been quite a serious economic loss to the owners concerned.

#### Send Your Lad to Hawkesbury Agricultural College.

THERE is no intention at the present juncture of descontinuing the agriculture diploma course (H.D.A.) at Hawkesbury Agricultural College, and the first session for 1943 is scheduled to commence on 4th February next.

Unfortunately, owing to lack of applicants, it has been necessary to suspend the course for the diploma in dairying (H.D.D.) for the duration of the war, but there has

not been any suggestion that the College should close down or that the course for the diploma in agriculture should be suspended.

#### LOCAL MARKET BUTTER QUALITY.

THE CHIEF of the Division of Dairying (Mr. O. C. Ballhausen) reports that, of the butter placed on the local market since 1st March last, 949 per cent was of "choicest" grade.

#### . . PARAGRAPHS AND NOTICES . .

#### Ohanez Grape.

#### Cross-pollinate for Bigger Crops.

H. L. MANUEL, Viticultural Expert.

POOR yields from the Ohanez grape are to some extent due to lack of cross-pollination. This observation is confirmed by the fact that vineyards most affected by poor cropping are those in which Ohanez (also known as Daria and Almeria) are more or less isolated from other varieties. On the other hand, Ohanez growing amongst numerous other varieties in the Department's experiment plots have always cropped satisfactorily.

The abnormal structure of the flowers of the Ohanez make natural pollination more difficult than in most other varieties. The stamens are very short, bending downwards when the corolla is shed. The anthers and pollen sacks are much lower than the stigma.

Anything that can be done to improve the yield of this variety is worth while, as the Ohanez grape is probably the hardiest grape for long transport, and certainly the best and safest variety for the export trade. In Western Australia it is grown extensively for this purpose, and in New South Wales is grown commercially in the Murrumbidgee Irrigation Area.

#### Cross-pollination Experiments.

The Viticultural Branch carried out cross-pollmation experiments last season on overhead trellised Ohanez vines in Mr. F. Crawford's vineyard at Griffith. The following methods of applying the pollen were tried, with the results shown:—

In the first experiment, cellophane hags were placed over a number of marked Ohanez young bunches before the flowers started to open. When the process of cross-pollination was to be undertaken, it was found on opening up the bags covering the marked Ohanez bunches that 20 per cent. of the bunches were at the right stage to receive the pollen from other varieties, that is, just as the flowers were opening. Sixty per

cent of these bunches set heavy crops; in some instances the bunches were very tightly packed with fruit. Pollen collected from the varieties Valensy, Zante Currant, Gordo Blanco and Cornichon were used, the pollen being collected by placing bags over the young bunches of these varieties before flowering. Small amounts of the pollen were then transferred to the Ohanez bagged bunches.

In the second experiment, the pollen of the other varieties mentioned was mixed with water. Sufficient pollen to cover a 3d. piece was mixed with half a pint of water. This was thoroughly agitated and sprayed on to the young Ohanez bunches with a small atomiser. The bunches treated in this manner were not bagged previously, but simply sprayed when the Ohanez vines were flowering About 20 per cent. of the bunches were too advanced, but even so it was found later that 70 per cent. of the bunches so treated set good crops. This method appears very satisfactory, and even with a small atomiser a fair area can be covered during a day.

As can be readily understood, the opening of the young flowers does not take place simultaneously, but is spread over a period, and in consequence more than one spraying would be necessary.

#### Improved Setting Very Noticeable.

On walking through the vineyard after the setting of the grapes, one could easily pick out the treated vines, owing to their heavy crop compared with the untreated ones.

The Valensy variety is a prolific pollen bearer, and flowers at the same time as Ohanez Where used, it appeared to get slightly better results than the other varieties. Zante Currant is not as heavy a pollen producer, but the Ohanez treated with this polten set their fruit well. The Cornichon and Gordo did not produce as much pollen as the other two mentioned.

#### · Potato Contract Forms Must be Completed and Returned.

All growers in coastal and inland districts, other than the tablelands, who plant ½ acre or more of potatoes, must complete a contract with the Commonwealth Government. It has come under the notice of the Plant Industry Division of the Department of Agriculture that many potato growers in early coastal and inland districts have

not yet returned their contract forms to the merchant from whom they are obtaining their seed supplies. It is desired to point out that the contracts are not valid unless signed by an officer of the Department of Agriculture who has authority to sign on behalf of the Commonwealth Government. All growers at present holding blue

contract forms should therefore take immediate steps to have them signed. This can be done either by a direct approach to an authorised officer of the Department, or by lodging the forms with the seed merchant, who will then arrange to have them signed.

When the forms have been signed the merchant will return one copy to the grower, retain one copy for his own use, and forward the third copy to the Secretary, N.S.W. Potato Advisory Committee. Department of Commerce, Sydney. It is essential that a copy should be received for registration by the Potato Advisory Committee, as otherwise there is no evidence that the contract To safeguard their own interests all potato growers should make sure that a copy of their contract has been forwarded to this Committee.

following departmental officers have authority to sign potato contracts:—
Darragh, W. H., 102 Victoria-street, Grafton.
Hardy, W. D., 23 Elizabeth-street, Moss Vale.
Nicholson, G., Essex-street, Coonabarabran.
Pitt, J. M., 21 River-street, Taree.
Powell, E. C., Rose-street, Parkes.
Benton, C. F. K, Oakhampton-road, West

Maitland.

National Mariana.

Spinks, W. H., Court House, Windsor.

Thomas, R. B., 31 Queens-road, Westmead.

Wood, R., Box 34, P.O., Gosford.

Eastwood, H. W., Box 23, P.O., Murwillumbah.

Dawson, G. T., Department of Agriculture,

Farrer-place, Sydney.

Judd, L., Department of Agriculture, Farrer-

place, Sydney.

Morgan, W. L., Department of Agriculture,
Farrer-place, Sydney.

Orman, A. C., Department of Agriculture,
Farrer-place, Sydney.

#### New Tyres of Steel for Farm Vehicles.

THIRTY thousand more farm vehicles, wanted by British farmers for this year's harvest, will be

htted with new standard wheel patterns.

Agricultural engineers in Britain were faced with two shortages—of materials for making pneumatic tyres for tractor trailers and tumbrils, and of seasoned timber and skilled wheelwright labour for making the old-fashioned wooden cart wheel.

The first of these problems had arisen long before the loss of rubber-producing territories in the East, for war work of greater priority had already made it difficult to get moulds and presses for tyre making. So the engineers have evolved an all-steel wheel 3 ft. in diameter with a minimum tyre width of 6 in. To absorb the shock formerly taken by the pneumatic tyre there are two coil springs between the axle hed and the cart, kept in line by a sliding pin in grooves.

On trials over heavy clay land, with the wheels frequently up to the axles in mud, an effort of 500 lb. per ton load was needed, compared with 300 for pneumatic tyres. A road test with two tons over a 7-mile trip at 10 and 15 miles per hour, showed the rubberless trailers to be quite

as good as those with pneumatic tyres. Outstanding among the features of these wheels is that they are not committed for all time to steel tyres; pneumatics can be added when available

For farm carts, the new all-steel wheels banish a factor which has kept their price high for many years—the multifarious sizes and types made up and down the country. Twenty different diameters have now been boiled down to one-4 ft 6 in., with 4 in tyre and phosphor bronze bearings, weighing about 41/2 cwt. the pair, and pulling a load of about 30 cwt. Trials showed that they had an improved performance of 50 per cent. over all previous cart wheels.

Believed to be the foundation of cheaper and more efficient farm working in peace time, these new designs with their standard interchangeable parts and 33-1/3 per cent. saving in cost, have been given to the world by the British Agricultural Engineers' Association free of all patent and licence rights. The association is also arranging to buy materials, to manufacture and to dis-tribute in quantity. But what is more important for Britain at the moment is that these and the 3 ft. wheels can be turned out in as many months as it took years for the older types

#### Cattle Tick Eradication.

#### No Abortions During Twelve Months Regular Dipping.

It is often asserted that dipping causes large numbers of cows to abort. Whilst there is a possibility that any violence may cause abortion, it is quite certain that most of the abortions which occur amongst cattle are associated with infection by the organism causing contagious abortion, writes Mr. Max Henry, Chief of the Division of Animal Industry, Department of Agriculture.

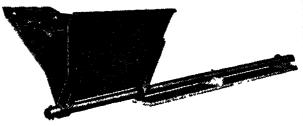
It is not easy to secure accurate figures, but the following is the known history of one herd :-

This herd comprises sixty-five milking cows and underwent dipping at fourteen-day intervals for a period of twelve months in order to control tick fever. During that period, which has just termin-ated, the owner of the herd sold fifty-five bobby calves, retained six calves and sold four hides off small calves. There were no abortions during the period of dipping.

## Solve the Blowfly Problem

the scientific way!

Here is the new scientific process of fighting the most harassing and expensive pest known to the industry. It reduces to a minimum the necessity of continually waging a ceaseless war against this great menace.



## M.V. CRADLE (PATENTED)

FOR MULES OPERATION

The low cost of the equipment, combined with the saving of labour, time, and money, to say nothing of the greatly reduced mortality rate, make the MULES OPERATION an outstanding contribution to the industry, in fact the M.V. (Patented) CRADLE is a first class investment. PREVENTION IS BETTER THAN CURE.

WRITE FOR FULL PARTICULARS - TO-DAY!

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Sydney.

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# "FLYACIDE" The Ideal Fly Dressing.

"FLYACIDE"—prepared exactly to the C.S.I.R. prescription for "B.T.B. 15"—is the nearest approach to the perfect fly dressing yet discovered.

IT HEALS.

KILLS MAGGOTS.

DOES NOT IRRITATE.

DOES NOT STAIN OR DAMAGE WOOL.

LOW COST AND CHEAP FREIGHT.

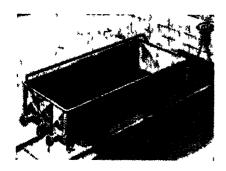
For 20/9 we will post you 4 gals. "FLYACIDE."

GRAZCOS

The Graziers' Co-operative Shearing Co. Ltd.

GRAZCOS HOUSE: 46 YOUNG STREET, SYDNEY

When YOU feel that it doesn't matter if you tie-up a railway truck LOOK AT THIS PICTURE!



SEE how useless the truck is and then reflect on the serious result of failing to load or unload trucks promptly.

In their present state—"flat out" to provide sufficient transport for Defence personnel, equipment, and munitions—the Railways cannot afford to have any vehicle or machine idle for even a period of time which may appear inconsequential.

Every such act slows up the war effort, so-

#### DON'T DELAY TRUCKS.

It is foolish, wasteful, dangerous, unpatriotic.

S R. NICHOLAS,
Acting Secretary for Railways.

### PREVENT BONE CHEWING



# Feed the best mineral supplement TRI-CAL-OS BONE FLOUR

When pastures are known to lack adequate supplies of calcium and phosphorus, the essential minerals for production, and when evidence is found of stock needing these minerals by chewing bones, the mineral content of the pastures must be supplemented by feeding Trical-os Bone Flour, the pure bone product, which contains a guaranteed minimum of 33% phosphoric acid and 40% lime and which is specially processed to ensure maximum diges-Tri-cal-os fed regularly is a safeguard against deficiency diseases and bone troubles. Production will improve.

Tri-cal-os is obtainable from stock and station suppliers, merchants and general stores.

Write for folders and particulars about-

## TRI-CAL-OS

Sterilised

#### BONE FLOUR

Davis Gelatine (Australia) Pty Ltd G.P.O. Box 3583 S, Sydney, N.S.W.

#### Tubercle-free Herds.

The following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
T M Tumbull ( Donting to Commence)		1942.	The same of the sa		1943.
J. M. Turpbull, "Pastime," Kayuga-road, Muswellbrook	82	5 Sept.	Liverpool State Hospital and Home K. W. D. Humphries, "Karoola," Muswell-	102	10 Apri
Peel River Land and Mineral Co., Tamworth	J "-	3 ; }	brook	162	24
(Beef Shorthorns)	16	8 ,,	H. F. White, Bald Blair, Guyra (Aberdeen		-4 11
. I. Toobey, "Mandemat," Berrima	56	8 ,,	Angus)	137	26 .,
V S. Grant, Braidwood	146	13 "	St. Michael's Orphanage, Baulkham Hills F. C. Harcombe, Hillcrest Farm, Warialda	18	5
. Hannaford, Braidwood	24	14 ,,	Road, Inverell	32	15
arrer Memorial Agricultural High School,		"	A. N. De Fraine, Reservoir Hill, Invereil	22	15
Nemingha	27	17 "	Grafton Experiment Farm	190	17 ,,
it. Vincent's Boys' Home, Westmead	19	19 ,,	Sir F. H. Stewart, Dundas	6	30 ,.
E. I., Killen, "Pine Park," Mumbil G. M. Edwards, Uralla	201	20 ,,	S. E. E. Cohen, Auburn Vale Road, Invereil	23	12 May
. Brownlaw, Gol Gol	24	22 ,, 26 ,,	B. N. Coote, Auburn Vale Road, Invereil J. De Ville, Invereil	42 10	14 ,, 15 ,,
ohn Macarthur Memorial Agricultural High	37	,,	Cowra Experiment Farm	41	27 Jun
School, Glenfield	33	26 ,,	P. M. Burtenshaw, Killean, Inverell	41	27 ,,
. I. Fairbairn, Woomargama	210	26 ,,	A. E. Liggins, "St. Leger Dairy," Kuring-gai		
unacy Department, Rydalmere Mental			Chase Road, Turramurra North	52	7 July
. and C. Ryall, 5 Western Avenue, West	48	27	kahlua Pastoral Co., "Kahlua," Coolac	49 314	9 ,,
Wollongong	47	z Oct	W. Budden, "Hunter View," Kayuga Road,	3-4	10 ,,
W. J. Stephenson, "Hill View," Fig Tree	23	10 ,,	Muswellbrook	18	5 Aug.
W. C. Wyatt, Sherwood Road, Merrylands		12 ,,	i. McLane, Wellingrove, Inversil	33	10 ,,
Ehsman Bros., Inverell Hawkesbury Agricultural College, Richmond	25	17 "	The William Thompson Masonic School, Baulkham Hills		
(Jerseys)	128	18 ,,	Baulkham Hills		28
Sevenhoe Estates, Scope	65	31	Navua Ltd., Grose Wold, via Richmond	35	20 ,,
unacy Department, Gladesville Menta	1;	1	(Tersevs)	113	4 Sept
Hospital	. 22	14 Nov.	Australian Missionary College, Cooranbong	113	8 ,,
Bathurst Experiment Farm (Ayrshires) W. W. Martin, "Narooma," Urana Road	21	18 ,,	Department of Education, Gosford Farm		
Wagga	150	29 .,	A. L. Logue, "Thornbro," Muswellbrook	40	29 13 Oct.
A. G. Wilson, Exeter (Jerseys)	. 68	29 ,,	Barnardo Farm School, Mowbray Park		4
		1	Wollongbar Experiment Farm		4 Dec
McGarvie Smith Animal Health Farm, Liver-		1943.	State Penitentiary, Long Bay	10	9 ,,
pool Lunacy Department, Parramatta Menta	65	1 Feb		1	
Hospital	. 31	6	Limond Bros., Morisset	60	1944. 13 Jan
The Sydney Church of England Gramma:	r	" "	Department of Education, Yanco Agricultural	-	-3
School, Moss Vale	. 55	6 ,,	High School	69	6 Feb
Tudor House School, Moss Vale	.1 17	6 ,,	Riverina Welfare Farm, Yanco St. Ignatius College, Riverview	, ,,	6 .,
koyong School, Moss Vale New England Girls' Grammar School, Armidale	25	6	St. Ignatius College, Riverview C. Wilton, Bligh Street, Muswellbrook		27 ,,
A. E. Stace, Taylor Street, Armidale		7	N. L. Forster, Abington, Armidale (Aberdeen	75	3 .,
New England University College, Armidale	13	1 Mar	Angus)	188	12
W. Boland, "Seaton," Inverell	و ا	1 ,,	Forster and Sons, Abington Armidale (Jerseys)	87	13 ,,
Parker Bros., Hampton Court Dairy, Inverei			Wagga Experiment Farm (Jerseys)	81	20 ,,
A. D. Frater, King's Plain Road, Inverell A. C. O'Dea, Perry Street, Dundas	. 104	19 ,,	Lunacy Department, Callan Park Mental Hospital	26	I May
I rangle Experiment Farm, Trangle	138	19 ,,	T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 Jun
Emu Plains Prison Farm	100	20 ,,	New England Experiment Farm, Glen Innes	3,	, ,,
Lunacy Department, Morisset Mental Hospital		25	(Jerseys)	73	27
Berry Training Farm, Berry	. 114		G. T. Reid, "Narrengullen," Yass		3 July
K. C. Dixon, Élwatan, Castle Hill (Jerseys)	23	3	N. East, Gum Flat Road, Inversil	61	13 A ug

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Heney, Chief of Division of Animal Industry.

#### Tobacco Instructor Appointed to Tamworth District.

Mr. C. Kirton, who for some time past has been in charge of the Tobacco Experiment Station at Ashford, has been transferred to Tamworth to undertake the instructional work carried out in that district by Mr. H.

W. Chaffey prior to his enlistment in the A.I.F. Mr. Kirton will also visit the Ashford and neighbouring districts for instructional purposes.

#### Brucellosis-free Herd Scheme (Swine).

#### LIST OF ACCREDITED HERDS.

THE following is a list of the names and addresses of owners of herds which have been declared brucellosisfree in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Registered and Adams, J. P., "Melton," Daysdale.
Allard, S. R., Cleobury Stud, Werombie Road, via Camden.
Bathurst Experiment Farm, Bathurst.
Campbell, D., Hillangrove, "Wamberal," via Gosford.
Chapman, G. E. and Son, "Disbe Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Croft, F., Lugwardine, Kentucky.
Draper, R. B., "Glengar," Capertee.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Gratton Experiment Farm, Grafton.
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College. Richmond Hawkesbury Agricultural College, Richmond. Holland, A. I.., Argonne, Tubbul.

John Macarthur Agricultural High School, Glenfield. Liverpool State Hospital and Home, Liverpool. Maybin, N. C., Towac, Orange. McCaughey Memorial Agricultural High School, Yanco. New England Experiment Farm, Glen Innes. Newington State Hospital and Home, Newington. Riverna Welfare Farm, Yanco. Government Agricultural Training Farm, Scheyville. Shirley, G. F., "Camelot," Penrith. Smith, J. M., Eulo Glen, Urana. Stewart, Sir Frederick, "St. Cloud," Dundas, Wagga Experiment Farm, Bomen. White, A. N., Blakeney Stud, Orange. Williams, G. K. B., "Gwandalan," Grenfell. Wilson, A. G., Blytheswood, Exeter. Wollongbar Experiment Farm, Wollongbar. Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst. Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Afforestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralla.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.
Morisset Mental Hospital, Mogisset Morisset Mental Hospital, Morisset.

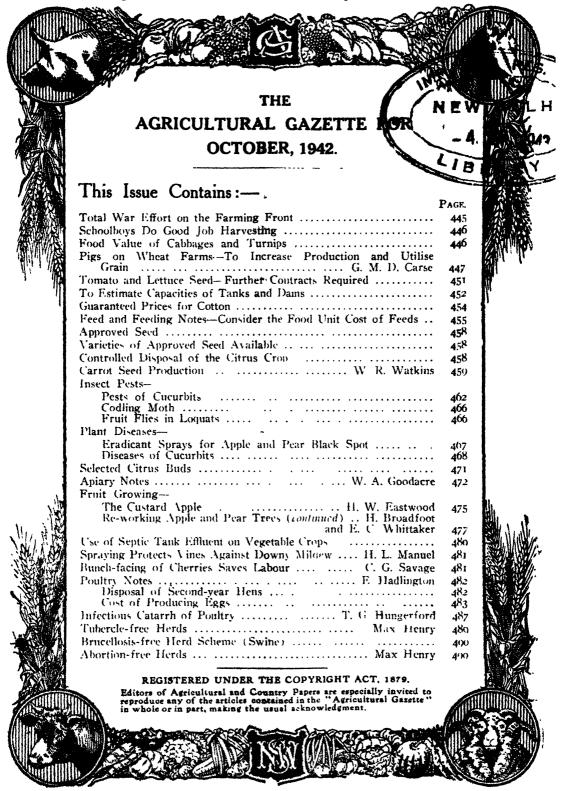
Oberon Prison Camp, Oberon. Orange Mental Hospital, Orange. Parramatta Gaol, Parramatta. Parramatta Mental Hospital, Parramatta. Peat and Milson Islands Mental Hospital, Hawkesbury River, Pollak, V., Marata, Harrow Road, Glenfield.
Smith, C. W. J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton. Waterfall Sanatorium, Waterfall.

#### Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:

Owner and Adviress.	Number in berd.		Number in herd.
Bathurst Experiment Farm (Ayrshires)  Bauerle, P. A. rfolbrook  Bush, W., Ben Lomond Carrick, G., "Clonlea," Central Tilba Cowra Experiment Farm (Ayrshires) Curtis, A., Meryla, Morven Department of Education—Farm Home for Boys, Gosford Department of Education—Farm Home for Boys, Mittagong Dixson, R. C., "Elwatan," Castle Hill East, N., Gum Flat Road, Inverell Edwards, G. M., "Rothwick," Uralia (Jerseys). Fairbridge Farm School, Molong Farrer Memorial Agricultural High School, Nemingha Forster and Sons, Abington, Armidale (Aberdeen Angus) Forster, N. L., Abington, Armidale (Aberdeen Angus) Hawkesbury Agricultural College, Richmond (Jerseys). Hicks A. A., Estate, Culcairn Hill, E. Pritchard, Bowling Alley Pt. (Jerseys) Hordern, E. D., Cabramatia (A.I.S.) John McArthur Memorial Agricultural High School, Glenfield  Killen, E. L., "Pine Park," Mumbil Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus)	38 24 43 43 75 27 265 188 108 43 100 95	McEachern, H., Tarcutta (Red Poil) McSweeney, W. J., "The Rivers," Canowindra (Jerseys) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital Navus Ltd., Grose Wold, via Richmond (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., (Beef Shorthorns) Tamworth. Reid, G. T., "Narrangullen," Yass Robertson, D. M., Scone Rydslmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud," Spurway- street, Dundas Trangie Experiment Farm, Trangie Wagga Experiment Farm, Trangie Wagga Experiment Farm, Women, N.S.W. Walker, Jas. R., "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen- Angus) Williams, Chas., Ben Lomond Young, A. H., "Rock Lynn," Cudal (Polled Beef Short- horns)	9 51 125 80 132 97 16 60 120 171 83 30 66 9 88 81 32

MAX HENRY, Chief of Division of Animal Industry.



## FLYACIDE

(B.T.B.-15)

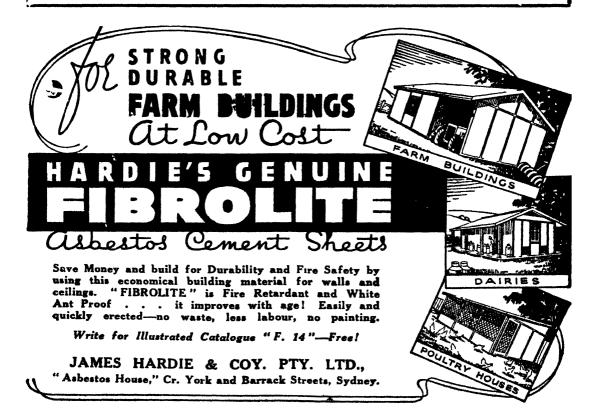
For Flystrike, Lamb Marking, Dressing Rams' Heads and for Shearing Cuts.

Small cartons (2 gals.) . . 9/- f.o.r. Sydney
Large cartons (12 gals.) . . . . . 54/- , , ,

Send 20/9 (plus exchange on cheques) and we will post sufficient FLYACIDE to make 4 gals. Flyacide Dressing to any address in N.S.W.

## GRAZCOS

The Graziers' Co-operative Shearing Co Ltd GRAZCOS HOUSE: 46 YOUNG STREET, SYDNEY





The Agricultural Bagette.

October, 1942.

## TOTAL WAR EFFORT ON THE FARMING FRONT.

"If I have to take a chance of being short of tucker in six or twelve months' time, or of being short of fighting personnel in the next six months, the risk I am taking is being short of tucker"—The Prime Minister's reply in the House of Representatives to a question relative to the release of rural manpower from the fighting forces.

This statement, based on, we can be sure, an intimate and thorough knowledge of Australia's present critical position, should make it plain to those who have been clamouring for release of men from the forces that the primary industries will have to rely on their present labour resources; there will be few, if any, releases.

To release men from the army is the obvious solution and easiest way out of the rural manpower difficulty. But the way to victory is going to be neither obvious nor easy

going to be neither obvious nor easy.

At the back of this clamour for releases from the fighting forces would appear to be a lack of realisation of what is meant by a total war effort—something which all acclaim but so few really try to put into effect. For an all-in war effort there are only two major national requirements—men and materials. The greatest number possible of the nation's fittest manhood must be in the fighting forces, and to allow of this the nation's

other requirement—materials—must be produced with a minimum of labour.

Shortly, production goals or targets will be set up for each State. These goals will define what are the nation's essential wartime requirements, both as to kind and quantity, of primary products. Producers will be promoting a total war effort only if those goals are achieved with the use of a minimum of labour. There will be little gained—in total—if the job is done at the expense (in manpower) of the fighting forces. Such would be tantamount to putting into one war-effort "pocket" what has been taken out of another, and perhaps more vital, "pocket."

#### BRITAIN'S AMAZING WAR EFFORT.

ACCORDING to a recent press report twothirds of the British people between the ages of 14 and 65 are engaged on full-time war work.

As can readily be imagined, Britain's labour problem is immense, yet this year there are 6,000,000 acres more under cultivation, and the production of wheat, oats and barley has been more than doubled.

Milk production for the first six months of 1942 was 10,000,000 gallons above the prewar average, despite the lack of imported feeding-stuffs.

An all-in war effort on the farming front calls for a greater co-operative effort and more initiative than has ever before been demanded. Fortunately, the recently formed district War Agricultural Committees in this State are sufficiently well established now to help plan, direct, control and co-ordinate this huge co-operative effort. Labour

and machines must be pooled, urban labour groups organised, and full use made of the Women's Land Army, school boys and similar sources of labour. Farm operations should be staggered, where possible, to allow of the full-time use or available labour; small farms should, if necessary, be grouped and worked as one large farm; the small flock should be shorn as part of the nearest large flock; transport should be organised (perhaps zoned) to save man-hours, machine-hours and fuel In other words, primary producers must forget boundary fences and individual interests if they are really in earnest about a total war effort. Available labour, on the other hand, should, if necessary, be prepared to forego, for the time being, hard-won privileges. As in

the army, the job to be done should alone determine the amount of effort and time expended on it.

Even if the production goals are not achieved in some instances, consumer rationing (for which there is ample scope without imposing hardship) could readily be applied to bridge the gap. If Mr. Curtin's words are to be accepted at face value, that course is preferable to withdrawing men from, and thus weakening, the fighting forces just for the sake of ensuring peace-time standards of comfort to the consuming public.

Once it is fully realised what is meant by an

Once it is fully realised what is meant by an all-in war effort, the clamour for army releases should cease Continuance of the clamour will evidence either lack of sincerity or foolhardiness.

#### Schoolboys Do Good Job Harvesting.

ENCOURAGING news from Britain shows that in spite of an acute labour shortage the best harvest for years is being gathered in record time. This has been made possible by the unselfish patriotism of men and women too old or medically unfit for more active war work and by the enthusiasm of boys and girls as yet too young for absorption in the forces or in munition factories.

The same spirit is being manifested in Australia. Thousands of state and private school teachers will lead their pupils into local harvest fields during the long summer vacation when the harvest period is at its peak. Thousands of women in the Australian Women's Land Army form a mobile force for use when required.

The Director-General of Man Power quotes, with keen appreciation, a recent

incident where a Moss Vale (N,S.W.) farmer was faced with the total loss of a turnip crop, grown under contract to the Defence Department. Finding it impossible to get other labour he advertised for children to do the job. On their own or borrowed bicycles, twenty-three youngsters turned up at the farm and in three days lifted 20 tons of turnips. The farmer paid the children 1s. 6d. a bag and several of them announced that they were going to put their earnings into War Savings Certificates.

Mr. Wurth stresses that team work and sound organisation is essential if local labour is to be used to the best advantage in this way. Individuals must work under direction and supervision of the local War Agricultural Committee. The local committee will be advised and directed by the district War Agricultural Committee.

#### Food Value of Cabbages and Turnips.

CABBAGES and turnips are usually readily available to the consumer at this period of the year, and as certain other winter vegetables such as potatoes and peas are not so easy to obtain at the present time, the Division of Plant Industry of the Department directs attention to the nutritive value of both cabbages and turnips.

Cabbage is a particularly useful vegetable and has a high nutritive value, being an excellent source of minerals such as calcium and iron as well as being rich in vitamins. Cabbage has a high content of vitamin C and also contains appreciable amounts of both vitamins A and B. It is a particularly useful source of vitamin C, as this vitamin is readily lost from many green vegetables during storage and cook-

ing, but the rate of loss in cabbage is much slower than from greens such as lettuce and silver beet.

White turnips and swedes should be used more extensively at the present time as substitutes for potatoes, since the latter vegetable is in very short supply. Turnips do not possess all the nutritive qualities of potatoes, as their carbohydrate content is much lower, although they contain an appreciable quantity of sugar. Turnips are a good source of calcium, and also provide reasonable amounts of both vitamins C and A. Turnip tops, if cooked in the same way as silver beet, are an excellent green vegetable, being very rich in vitamins C and A, as well as providing substantial amounts of the B vitamin.

#### PIGS ON WHEAT FARMS

#### TO INCREASE PRODUCTION AND UTILISE GRAIN.

#### The Merits of "Dry" Feeding.

G. M. D. Carse, Piggery Instructor, Hawkesbury Agricultural College.

IN Australia to-day we face a shortage of supplies of pork and bacon, and, with increased prices as an inducement, a call has been made for greater pig production. At the same time we have the greatest surplus of wheat in history—and wheat is one of our best pig feeds. Many of the distribution and transport problems in connection with making wheat available to our regular pig raisers are receiving consideration, but it should also be realised that there is still much room for expansion of pig raising amongst wheat farmers themselves.

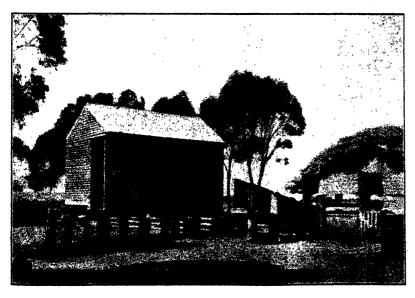
A simple calculation will indicate the value to the nation's war effort of feeding wheat to pigs on those wheat farms where sufficient labour is available. To produce a bacon pig from conception to marketing requires about 9 bushels of wheat. A herd of ten brood sows will produce 100 to 120 bacon pigs per year, consuming approximately 1,000 bushels of wheat. Five hundred wheat farmers, each with ten brood sows, could therefore use half a million bushels of wheat per year, and produce fifty thousand bacon carcases.

The reluctance of wheat farmers to take up pig-raising is usually based on a belief that the feeding of pigs is complicated and unpleasant. Many are under the impression that the feed has to be cooked or soaked and fed as "slops," that intensive housing and yard accommodation is necessary and that much unpleasant labour has to be undertaken to keep sheds and yards clean. Actually, under modern methods, such fears

are groundless and nowadays pig-raising can be made the most interesting and congenial section of the livestock industry.

#### Historical Background.

According to early historical records the pig was originally a grazing animal roaming at will in the forests. As time marched on, however, it became the main domestic animal of the peasant or cottager, largely on



Feed Shed and Loading Race.

Located in a position handy to the piggery.

[Photo by N. A. Steel.

account or its convenient size, its ability to thrive on many types of food and the succulence of its flesh. Its powerful digestion led to it being regarded as a scavenger in its feeding habits and associated with "swill" feed, composed of refuse from the cottager's kitchen and garden. As the area of land owned by a cottager was ordinarily small, the pig had necessarily to be confined to a small pen or sty. Thus we have the historical background of the traditional swill-fed pig kept in a small, unhygienic sty, and often fed till it reached enormous size.



Farrowing Pen Suitable for Pigs on a Wheat
Farm
Photo by \( \cdot 1 \) Steel

As big cities became established the swill method of feeding pigs received a further impetus, when it was realised by municipal authorities that such was a profitable method of disposing of food refuse. This attitude of mind towards pig feeding persisted in many quarters until recent years.

#### "Dry" Feeding.

There has, however, been a steadily growing realisation for some time now that the pig is at its best when regarded as a grazing animal, and fed as such along more or less the same lines as our other domestic animals. That is to say the pig should be grazed on good pasture, supplemented by a concentrated food and provided with water to drink

This conception of pig-feeding has been applied to the feeding of kitchen scraps. Thus we find that in Great Britain and America kitchen, restaurant and hotel refuse is now processed and fed as a con-

centrated food. This concentrate, in the form of a paste or as a dry meal or powder, has substantially lower water content than the original product, and it therefore "keeps" longer. The fact that it is sterilised in the course of processing, presents a distinct advantage associated with disease control.

In Australia, with our vast wheat reserves, our large grazing areas and our genial climate, we have all that is required to develop this new attitude towards pig feeding. It may be that even in the dairying industry it will be economically sound, in time to come, to convert our separated milk, butternilk, and whey into powdered products and feed them as dry concentrates. In fact, work has already been carried out along those lines. From the point of view also of "levelling out" seasonal supplies the idea has obvious advantages.

#### Advantages of Dry Feeding.

The advantages to be gained from the introduction of a system of dry feeding in conjunction with grazing can be stated as follows—

- (1) A higher standard of hygiene will quickly become evident in the piggery. Feed spilled on floors of sheds and the laneways and yards offers an irresistible attraction to these
- (2) From the point of view of digestibility, the absence of a large proportion of water in the feed makes assimilation possible with the least expenditure of energy
- (3) It has been shown that the use of a concentrated food, plus ample grazing of good quality, leads not only to better health, but to a higher standard of quality in the resultant carcases.
- (4) The use of dry feed makes it possible to control the constituents in the ration, and to feed fixed quantities accurately.
- (5) Finally from the management point of view, labour in carting the water content around the piggery is reduced, many undesirable odours disappear and the work becomes much more pleasant.

#### A Successful "Dry" Ration.

At Hawkesbury Agricultural College the system of "slop" feeding has been discarded and replaced with a system of "dry" feeding

in which the following ration is fed in proportions as shown:—

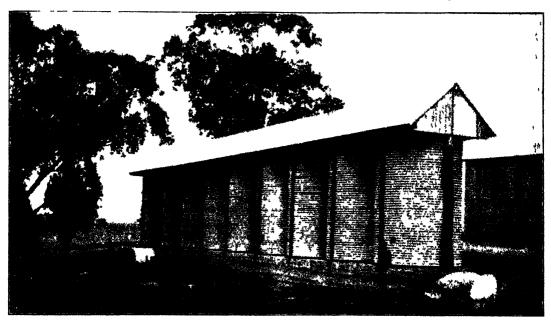
Crushed wheat	 lb. 180	
Meat-meal	 12	
Air-slaked lime	 1	
Coarse salt	 I	
Water	 60	

When properly mixed together the above constituents produce a loose, moist meal which can be easily handled and fed accurately in specific quantities.

Though the term "dry" feeding has been used it will be noted that water is included in the mixture in approximately the proportion of one part of water to three parts

It will be observed that the ration is simple in its composition. At one time it was the fashion to compound rations with up to ten different food constituents, together with up to six different mineral components. The tendency nowadays is towards simplicity. In the above ration the wheat provides the carbohydrate or "energy-producing" portion; the meat-meal the protein or "repair and growth" portion; the lime and salt provide the minerals not already present in the wheat, meat-meal or pasture.

In the absence of pasture, green feed is cut and fed; green wheat, oats, barley, rape, lucerne, and fresh waste vegetables are used



Storage Silos on a Wheat Farm Which Runs Seventy Brood Sows.

[Photo by A. A. Steel

of dry feed. The inclusion of this limited quantity of water is desirable for the following reasons:—

- (1) Prevention of waste from wheat dust, meat-meal dust and powdered lime blowing away during mixing and feeding.
- (2) Reduction of dust makes the work of mixing and feeding more pleasant.
  - (3) The feed is more palatable.
- (4) Enzymes are liberated, and the true food value of the ration becomes more readily available.

when available. As much green feed as can be satisfactorily "cleaned up" should be fed

#### The Crushing of Wheat.

Experiments in all the pig producing countries of the world have shown that crushed or cracked grain is more readily and completely digested by pigs than whole grain. The cost of crushing, however, must always be kept in mind, and at the present time, the labour involved must be considered. Experience at Hawkesbury College has shown, that young pigs up to three

and four months of age masticate whole grain so thoroughly that practically no loss of grain is apparent. As pigs progress in age, the quantity of whole, undigested grain in the faeces increases, and its presence is made evident by a strong, unpleasant odour. When pigs are provided with whole grain in self-feeders the loss of grain is markedly reduced, apparently because the incentive to gulp the feed in big mouthfuls is not present when the feed is available all the time.

Grains such as paddy rice, oats, and barley should always be crushed on account of their higher fibre content.

#### Mixing the Ration.

The thorough mixing of the various parts of a ration is extremely important. No matter how carefully the balance of a ration has been calculated, if the constituents of the ration are not uniformly blended, uniform results cannot be expected and will not be attained.

The method in operation at the College is to spread a measured quantity of wheat to a depth of 4 inches on the smooth, mixing floor of the feed shed. The measured quantity of water is then sprinkled on the wheat from a 3-gallon watering can. The appropriate quantities of meat-meal, airslaked lime and salt are spread evenly over The whole is then the damp wheat. "turned over" by shovel three times, much in the same way as concrete is mixed until a uniform mixture is obtained in which the salt, lime and meat-meal are evenly distributed throughout the wheat. For large quartities a concrete mixing machine can be effectively used.

What might be called the "management" approach to a ration must always be kept in mind. Obviously no matter how perfect a ration may be in its composition, if it is difficult to prepare and distribute, it at once stands condemned. That is to say, a ration must be capable of easy, quick and thorough mixing; it must not stick to mixing floors or utensils; it must be possible to measure it easily and accurately, and it must run or pour readily into troughs. The addition of too much water will make any crushed grain mixture sticky or gluey, so that it adheres to the mixing floor shovels, buckets and feed truck.

Ease and accuracy of measurement can be achieved by the use of large preserved fruit tins of the 10-lb. type. The use of 2- or 3-gallon buckets leads to much inaccuracy. Even with graduated buckets an error of up to 3 lb. is frequently made. The tin mentioned holds 6 lb. when full—a unit of convenient size and quantity with which to work.

#### The Use of Self-feeders.

When the ration is intended for use in self-feeders, water should not be included at time of mixing; in that way the danger of the feed becoming mouldy in the self-feeder will be avoided.

When properly constructed and cared for, a self-feeder will give good results and save much labour. Carefully controlled experiments have shown that the use of self-feeders has led to the consumption of a greater quantity of feed, a slightly longer feeding period and the production of a somewhat fatter carcase than is the case in individual feeding, but those points can be overlooked when the reduction in labour is remembered. A pamphlet on self-feeders for pigs is obtainable free from the Department of Agriculture.

#### The Quantity Fed and the Cost of the Ration.

The quantity of any ration recommended for feeding pigs can only be stated subject to a number of other factors which have to be taken into account by the skilful pigfeeder. Breed, strain or family, individuality of the pig, standard of housing and management, climate, season of year, availability and quality of pasture all affect the quantity of the ration to be fed.

In general, the ration is fed at the College on the basis of allowing I lb. for each month of age, with a maximum of 5 lb. for finishing a bacon pig Brood sows respond well on 2 lb. to 4 lb. When with litter, the quantity is increased gradually from the date of farrowing, until when the suckers are one month of age, a sow with eight suckers will receive 12 lb., i.e., 4 lb. for the sow and I lb. for each sucker. Stud boars also thrive well on 2 to 4 lb

With these figures as a guide, quantities are increased or decreased according to the condition of the individual pig. When good pasture is available the foregoing figures can be reduced by 30 to 50 per cent., and

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#### Obtainable from-

- Riverstone Meat Co. Pty. Ltd., 5 O'Connell Street, Sydney.
- Redbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- W. Angliss & Co (Aust.) Pty. Ltd. 42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Creek, Rockhampton.

when separated milk or buttermilk can be obtained, I gallon will replace I lb. of the mixture. A minimum of 50 per cent. of the mixture figures quoted should, however, always be fed.

The cost of the ration will vary widely, but throughout New South Wales, should not exceed 1d. per lb., at which figure it will return a satisfactory profit.

It should be noted that the quantities quoted are fed only once per day. The oft-repeated adage "Feed pigs a little and feed them often" with all the attendant extra labour costs, does not apply in a dry-feeding system.

#### Grazing.

The pig, as a grazing animal, should be provided with pasture of the best quality. The grass or other crop should be in the young leafy stage (about 6 inches high), to obtain the maximum amount of protein—the most expensive part of all rations. At that stage the grass is most easily digested.

Permanent pasture paddocks of lucerne, clover, rye grass, prairie grass, paspalum (coast) and kikuyu (coast) should be small, rested frequently, harrowed and top-dressed regularly and not overstocked. Temporary pastures of wheat, oats, barley and rape should also be used.

Under such conditions, grazing will replace up to half the standard quantities of concentrates recommended, will correct faults in the general ration, will supply vitamins and minerals, and will promote the health and comfort associated with the open air, sunshine and exercise.

#### Green Feed or Forage Feed.

If for any reason pasturing of pigs is not possible, every effort should be made to

supply cut green feed, such as green wheat, oats, barley, lucerne or rape. The best method of feeding green feed is to supply it as chaff and mix with the concentrates, in the same way as horse or cow feed.

Pigs, particularly the older stock, also relish well cured, sweet hay.



Self-feeder for Pigs in Use on a Wheat Parm.
[Photo by N. A. Steel.

#### Pleasant and Lucrative Pig-raising.

It must always be remembered that pigs vary greatly in capacity as food converters. Only a rough guide, on basic principles, has been given, to be adjusted according to the condition and the appearance of the pigs themselves. The successful pig-feeder aims to keep his pigs sleek and lean, with a bright shine or bloom on their coats and a bright lively look in their eyes.

From the facts given, however, it will be realised that the feeding of a wheat ration is a relatively straightforward matter. When combined with grazing, pig raising can be made pleasant and lucrative.

#### Tomato and Lettuce Seed-Further Contracts Required.

THE Division of Plant Industry of the Department of Agriculture desires to arrange further contracts, on behalf of the Commonwealth Vegetable Seed Committee, for the production of seed of certain varieties of lettuce and tomato.

The varieties of tomato of which seed production is required are: Bonny Best, Break-O'Day, Marglobe, Australian Earliana or Early Winner, Burwood Prize and Ponderosa. Lettuce varieties

are: Imperial 847, Imperial 44, Imperial 615, Imperial D.

Prices paid will be: Tomatoes, 25s. per lb.; lettuce, 6s. per lb.

Growers interested should contact their local Agricultural Instructor, or the Chief, Division of Plant Industry, Department of Agriculture, Box 36A, G.P.O., Sydney.

### Keep on Buying War Savings Certificates.

## To Estimate Capacities of Tanks and Dams.

THE question of calculating tank capacity arises on farm properties, not only when the construction of a new tank is under discussion or when one has been completed and the matter of payment is being considered, but also on many other occasions when the owner desires to know how much water is in the tanks.

The question of tank or dam capacity usually arises as soon as its construction is completed, and it is still dry, when the bottom measurements are readily taken. A handy formula for calculating the capacity of a tank is as follows:—

Add together—

Product of length and breadth at top. Product of length and breadth at bottom.

Product of sum of lengths (top and bottom) and sum of breadths (top and bottom).

Divide the result by-

Using this formula, the capacity of the tank illustrated in Fig. 1 would be found thus:—

Product of length and breadth at top

Product of length and breadth at bottom

Sum 
$$\times \frac{\text{depth}}{6} = 65,592 \times \frac{12}{6}$$
 cubic ft.  
= 65,592  $\times \frac{12}{6} \times \frac{17}{17}$  cubic yards  
= 4,859 cubic yards.

In estimating the volume of water in a dam, care must be taken, where the dam is built on a slope, to take the top measurements along the line of water level. Generally, of course, this precaution is not necessary, for slopes are not usually so great as to affect the measurement appreciably.

If the dam is full, and only the depth and the slope of the sides are known the bottom measurements can be calculated thus: "From the top measurements deduct the figure got by multiplying twice the depth by the horizontal component of the slope."

As an example, let the length and breadth at top of a dam be 120 feet and 90 feet respectively, the slope = 1 in 3, and the depth be 10 feet. (See Figs. 2 (a) and 2 (b).)

Then bottom length

=  $120 - (2 \times 10 \times 3) = 120 - 60 = 60$  ft.; Bottom breadth

 $-= 90 - (2 \times 10 \times 3) = 90 - 60 = 30 \text{ ft.}$ 

It is seen that the sides will all "come in," a horizontal distance of 30 feet, and the bottom measurements are less at both ends, and both sides, than the top measurements by this amount.

A problem which often confronts the tanksinker is to find the length and breadth he shall make his tank to give him the desired capacity. He usually can decide upon the number of cubic yards and the depth desired, but is then in doubt as to what length and breadth the tank must be made. To arrive at these measurements, the slope of the sides must be known. For example, suppose the top measurements are required for a tank of 5,000 cubic yards capacity, 12 feet (4 yards) deep, with a slope of 1 in 3. The procedure is as follows:—

(i) Find the number of cubic yards in an average section of the tank I yard deep. To do this divide the total capacity in cubic yards by the depth in yards. In this example -

Capacity of tank = 5,000 cubic yards

Capacity of average section =  $\frac{5,000}{4}$  cubic yards = 1,250 cubic yards.1

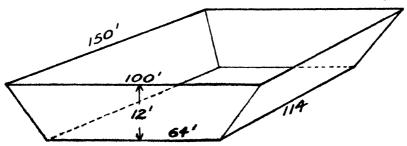


Fig. 1. -Diagram of Tank or Dam,

(ii) Take any two numbers which, multiplied together, give 1250, or an approximation to it—say 35 and 35, which, when multiplied, give 1,225. These two numbers (35 and 35) then represent the length and breadth in yards of the average section. In a dam with sloping sides, the average section is assumed to be half-way between the surface and the bottom of the tank. The measurements  $35 \times 35$  would correspond to the length and breadth of this section, midway between the top and bottom of the dam (Fig. 3).

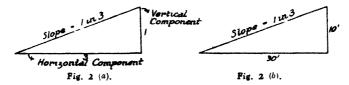
Average section = 
$$\frac{6,000}{5}$$
 = 1,200 cubic yards.

Mid-measurements, say,  $40 \times 30$  ( $\sim 1,200$  cubic yd.). Add to each end, depth  $\times$  slope figure = depth  $\times$  2.

Then top measurements

$$= 40 + (5 \times 2)$$
 and  $30 + (5 \times 2)$ 

It is possible to check these measurements by finding the bottom measurements and then calculating the capacity of the dam. To get bottom measurements:—



Add to the mid-measurements an t equal to the depth multiplied by the figure," i.e., the horizontal component slope.

Mid-measurement -- 40 × 30. Subtract depth × 2 in each case. Then bottom measurements
-- 40 -- (5 × 2) and 30 -- (5 × 2)
-= 30 and 20.

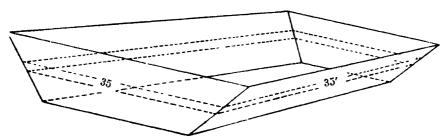


Fig. 3 Diagram of Tank, showing Average Section.

Thus in Fig. 4

Top length 
$$-35 + (4 \times 3) = 47$$
 yards  
Top breadth  $-35 + (4 \times 3) = 47$  yards

It will be seen that, in this case, it is necessary to add to the mid-measurements 6 yards for each end

These measurements would be checked as shown in the next example.

The top measurements of a tank having a capacity of 6,000 cubic yards, a depth of 15 feet, and a slope of T in 2, would be ascertained as follows:

From these measurements the capacity of the tank, calculated on the original formula, would be—

"Tops" 50 
$$\times$$
 40 2,000  
"Bottoms" 30  $\times$  20 = 600  
"Sums" 80  $\times$  60 4,800  
Total = 7,400  
Sum  $\times$  5 5  
= 0,100% cubic yards,

which is too much. There will always be a slight excess capacity from measurements obtained as above.

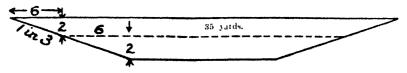


Fig. 4. - Longitudinal Section of a Tank.

By cutting down the length, say, by r yard, the volume would be :-

$$49 \times 40 = 1,960$$
 $29 \times 20 = 580$ 
 $78 \times 60 = 4,680$ 

$$Total = 7,220$$

$$Sum \times \frac{\text{depth}}{0} = \frac{7,220}{6} \times 5 = \frac{36,100}{6}$$

$$= 6,010 \$ \text{ cubic yards.}$$

This capacity of 6,016% cubic yards might be taken as near enough, considering theirregularities of surface, bottom and sides. The measurements are accurate enough for pegging out the tank, since in any case thecapacity would require to be obtained by actual measurement of lengths, breadths and depth, upon completion of sinking.

#### Economy in Use of Veterinary Preparations.

THE Minister for War Organisation of Industry (Mr. J. J. Dedman) has made an order pro-hibiting canvassing for orders for veterinary preparations of all kinds and limiting the advertising of such goods to announcement of the name and type of product, the price, and the source or sources from which it can be obtained.

The order also deals with stock-licks and the sale of salt and minerals for livestock. facture for sale of stock-licks is prohibited, and no stock food may contain more than 30 per cent. of salt. Sale of phosphates in any form for sheep is prohibited, and salt for sheep can be purchased only after obtaining a permit from the Chief Veterinary Officer, of the Department of Agriculture, or his deputies. Such permits may only be given when sheep are fed mainly on cereal grains and salt is required to induce the sheep to consume additional lime in lick forms; when sheep are grazing in areas deficient in cobalt or copper and these minerals have to be supplied in a salt-lick; and finally in such other special circumstances as the Chief Veterinary Officer of any State may decide.

Explaining reasons for this new order, Mr. Dedman said that there was a good deal of waste in the use of veterinary preparations and the materials used in some of them could ill be spared. Their use, sometimes beyond what was essential, and the laying in of stocks against the possible shortage later, were encouraged by advertisement and salesmanship.

"Many of the firms concerned," Mr. Dedman said, "have already cut down their advertising and reduced their staffs of salesmen, but others still continue. Some advertising is necessary so that those who have real need of veterinary medicines and the like may know where to obtain them This is provided for in the order."
Referring to the restrictions placed on minerals

for livestock, the Minister emphasised that the

prohibition of manufacture for sale of stock-licks would not prevent owners from obtaining such salt and minerals as might be necessary for the health and productivity of livestock. On the other hand, all unnecessary and wasteful use of licks must cease in the national interest. "There is no evidence," he said, "that under Australian conditions the iodine, sulphur and certain other minerals often included in proprietary mineral licks, are of the slightest value."

The order refers especially to phosphates and salt for sheep. Mr. Dedman referred to exhaustive experiments by the Council for Scientific and Industrial Research and other authorities, showing that additional phosphate in hone or mineral form is of no value to sheep. Phosphates were urgently needed as fertiliser, and it would be unreasonable to continue wasting them on sheep licks.

"Thousands of tons of salt are harvested and transported annually for sheep," Mr. Dedman added, "yet there is no evidence that sheep require salt except as an inducement to take minerals such as lime, copper or cobalt, of which they may be short under certain conditions and in certain well-known localities. The feeding of salt to sheep is a very old custom and many graziers in recent years have made a habit of feeding phosphates as well. It should reassure them to know that the restrictions now imposed have been approved by the Chief Veterinary Officers of every State and by the Division of Animal Health and Nutrition of the Council of Scientific and Industrial Research

"Salt and minerals can still be purchased as required for livestock other than sheep, and advice on the preparation and use of simplehome-made licks can be freely obtained from any livestock officer of any State Department of Agriculture."

#### Guaranteed Prices for Cotton.

For some time the Division of Plant Industry of the Department of Agriculture has been working in co-operation of farmers in an endeavour to establish the growing of cotton in suitable districts in New South Wales. Recently an appeal was made for additional growers in these areas to undertake growing of experimental plots this season with seed to be supplied free by the Department. In return the Department requires that accurate records of the venture be supplied.

The Queensland Minister for Agriculture has promised the fullest co-operation of his Department in this effort, and where sufficient cotton is available in any district or area to offset freight charges, arrangements can be made for the cotton

to be taken to the nearest Queensland ginnery.

The price guaranteed by the Commonwealth
Government, for the duration of the war, is 15d. per lb. for cotton lint, approximately equivalent to 51/4d. per lb. for seed cotton as harvested.

#### FEED and FEEDING NOTES.

#### CONSIDER THE FOOD UNIT COST OF FEEDS.\*

IT is intended to present regularly in the Gazette, for the use of those stockowners who have to buy feed for any class of animals, a review of the feeds available, and if possible, an estimate of future supplies, cost, and value on a food unit basis. That is, it is planned to advise stockowners as to the feeds which will supply food material at the cheapest prices.

This advice should be of particular value at present, in view of the rising costs of production and the necessity for more economic management of stock. In the past the differences between production costs and prices for primary products have usually been large enough to allow of considerable latitude in prices when buying fodder, but with increased strain on the economic resources of primary producers, this condition should no longer be allowed to continue.

As an illustration of the irrational and uneconomic purchasing of fodder, examples have been noted where fodder for sheep feeding has been purchased at a price about twice the cost of oats or maize, the fodder having about half the feeding value of these grains; that is, the feed cost about four times as much as grain per food unit. The annual financial loss to the primary industries in this State through similar purchases must run into many thousands of pounds

#### Starch and Protein Equivalents.

The only method of avoiding these pitfalls in purchasing fodder is to consider the food unit cost of feeds, *i.e.*, cost of units of actual nutriment in the feeds. Such a system has been in practice for some time in Great Britain. The basis of this approach to stock feeding is as follows:—All feeds may be reduced to an average analysis, and by means of digestibility and production trials the analysis brought down to two figures representing, respectively, the ability of all the nutriment in a feed to produce fat or energy, and the ability of the protein portion to supply protein to the animal body.

These figures are known as the starch and protein equivalents. Thus, maize is said to have an "S.E." (starch equivalent) of 78 and a "P.E." (protein equivalent) of 8; and oaten straw an S.E. of 21 and a P.E. of o.6. This, in effect, means that the food matter m 100 lb. of maize is equivalent to 78 lb. of pure starch in its ability to fatten or produce energy, and to 8 lb. of completely digestible pure protein in its ability to build up protein in the animal body. In the same way 100 lb. of oaten straw is equivalent to only 21 lb. of starch, and 0.6 lb. of digestible pure protein. It can be seen that maize contains  $\frac{78}{21}$  or nearly four times as much energy or fat producing material as oaten



Sheep Feeding from Self-feeders.

<sup>\*</sup> Prepared by the Division of Animal Industry in co operation with the Division of Marketing

straw; i.e., on a food unit basis, straw would have to be one quarter of the price of maize before it was a cheaper feed.

As the protein of these feeds is comparatively low compared with their energy contents, i.e., the ratio of starch to protein value is large (78 to 8, or about 10 to 1; and 21 to 0.6 or about 35 to 1 respectively) it is of little value in these cases using protein equivalents as a basis of cost comparison.

In the same way, the S.Es. of barley and oats are 71 and 62 respectively. Assume barley meal and crushed oats are available at 10s. and 10s. 6d. per 100 lb. (£10 and £10 10s. per short ton) respectively. All the facts are available for determining the cost of 1 lb. of starch equivalent (one starch unit for brevity).

As 100 lb. of barley meal costs 10s., 71 starch units cost 10s.,

1 starch unit costs 10s. od.,

which is about 1.7d. As 100 lb. of oats costs 10s. 6d.—

62 starch units costs 10s. 6d.,

1 starch unit costs  $\frac{10s. 6d.}{62}$  which is about 2d.

That is, barley meal is the cheaper feed by about 18 per cent.

Where feeds are bought on a bushel or cwt. basis the question is a little different, as it is first necessary to work out the number of starch units in a bushel of the several grains.

Feed. Starch Units per 100 lb.		Protein Units per Cost. 100 lb.		Cost per Starch Protein Unit. Unit.		Remarks.		
			Roughages.					
Lucerne Hay or Chaff	35-45 (average	9	£8 to £10 long ton*	2·1d 2·7d.	1 .	These roughages at present are expensive feed. Use a mini		
Oaten and Wheaten	,3	3	£7 to £8 ong ton*	2·3d 2·6d.		mum and substitute the		
Oaten and Wheaten Chaff.	40	3	£8 to £10 long ton* .	-		as for sheep and cattle.		
Oaten Straw		06	£8 long ton*	5d.	!	Straws too expensive for feed our		
Wheaten Straw	14	0.1	f8 long ton*	7d.		Straws too expensive for feed pur poses at present prices.		
Oat Hulls		0 5	£8 long ton*					
Rice Hulls	3	0.3			,	Not worth buying as feed at any price.		
			Starchy Concentre	ries.		France		
Maize	78 :	8.	5s. to 7s. bushel	1.6d1.9d.	(	Too expensive for feed purposes		
Maize Meal	78	8	2-7	2 2d.	.:	An expensive meal at present prices.		
Wheat	72	8	3s. 8d. bushel £7 10s. short ton†	rd.		Wheat and barley are both cheap		
Wheat Meal	72	8	47 105, short tont	herr	: 1	feeds. Will probably pay to		
Barley	71	7	35. bushel	14				
Barley Meal	71	÷ 1	12 short tont	Tiad		crush own grain if possible in-		
Oats	62	7 8	17 10s. short ton† 3s. bushel 17 short ton† 3s. bushel or £8 to £9 per short ton.†	1.5d.	::	stead of buying it as a meal.		
Crushed Oats	62	8	3s. 3d. to 3s. od. per 40 lb. or £8 to £9 per short ton.†	1.6d 1 od.	.	Not as good buying as wheat and barley		
Wheat Bran	55	10	£6 short ton†	1 3d.		Bran worth buying when avail- able for use as part of darry and poultry rations to improve the texture.		
Wheat Pollard	66	10		1·1d.	. !	Pollard good buying when available.		
Hominy Meal	78	8	£18 short ton†	2·8d.		An expensive feed at this price.		
	72	6 5				None available.		
Rice Pollard	72	7	1			None available.		
Molauses	50	1	£3 105.—44 gallon drum (515 lb.).	3 3d	:	Supplies short. Only worth buying for drought use.		
			Protein Concentra	ites.		,,		
Meat Meal (60 per cent.!	8o i	55 i	fio ios. short tont	i		Commission about 125-111 1 1		
crude protein).		33	gio ros. short tony		2·3d.	Supplies short. Should only be used for pig and poultry		
Blood Meal	66	67	(14 short tont	4	2.54	industry.		
Liver Meal	94	58	£14 short tont	]	2.2d.	Supplies available.		
Fish Meal (60 per cent	59	53			2·9d.	Supplies available.		
crude protein). Linseed Meal	72	25	f10 10s, short tont			None available.		
Peanut Meal	78	43	£6 ros. short tont	1·7d.	5d.	Stocks will stand increased demands.		
Cocoanut Meal	76	16			1.8d.	Supplies limited, but the cheapest protein concentrate.		
Maize Gluten	78	20	£7 10s. short ton†	1·2d. 1·4d.	5·7d. 5·4d.	Supplies short and sales limited. Supplies limited.		

Thus 100 lb. of maize contains 78 starch units. I lb. of maize contains  $\frac{78}{100}$  starch units.

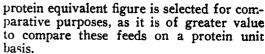
56 lb. (1 bushel) contains 
$$\frac{78}{100} \times 56$$
= 44 starch units.

That is, one bushel of maize contains 44 starch units.

Similarly for other feeds-

- I bushel of wheat contains 44 starch units.
- I bushel of oats contains 25 starch units.
- t bushel of barley contains 36 starch units.
- 1 cwt. oaten or wheaten hay contains 37 starch units.
- I cwt. oaten or wheaten chaff contains 45 starch units.
- I cwt. lucerne hay or chaff contains 40 to 50 starch units-depending on quality, average quality, 45 units.

Thus if oats are 3s. 6d. per bushel and maize 7s, and the cost of crushing the oats is, say, 2d. per bushel, and of cracking the maize 3d. per bushel, bringing the prices to



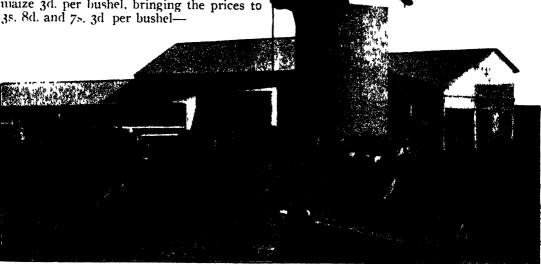
Thus peanut meal may be available at 7s. 6d. per 100 lb. and meat meal (60 per cent. crude protein type) at 10s. 6d. per 100

In this case—

Price of protein unit in peanut meal

Price of protein unit in meat meal  $= \frac{\cos. 6d.}{55}, i.e., 2.3d.$ 

The difference is about 10 per cent. in favour of peanut meal, but as the protein of meat meal is of somewhat greater nutritional value than that from oil meals, the difference could largely be ignored, and the more easily obtainable feed bought, or a mixture fed.



Cost per starch unit in oats is

$$\frac{3s.}{2}\frac{8d.}{5}$$
, about r.8d.

Cost per starch unit in maize is

That is, there is a difference of about 11 per cent. in cost in favour of oats.

In the case of protein rich-feeds (meat meal, blood meal, liver meal, peanut meal, linseed meal and cottonseed meal, etc.) the

The vegetable protein concentrates, such as oil meals, may at times be as cheap, or nearly as cheap as starch concentrates on a starch unit basis, so that the economy of purchasing them under these circumstances is obvious.

#### Comparative Values at Current Prices.

In the accompanying table the feeds listed do not include any of the proprietary mixtures, but the starch equivalent value of (Continued on page 486.)

## Approved Seed.

October, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twenty-five for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in the Department and information will be supplied

regarding it to inquirers.

Cauliflowers.
Shorts—H. Burton Bradley, Sherwood Farm,
Moorland.

Hawkesbury Solid White—E. A. Sharp, 110-Gordon-ayenue, Hamilton.

Phenomenal Five Months—E. A. Sharp, 110-Gordon-avenue, Hamilton.

Tomatoes.

Marvana — Rumseys Seeds Pty. Ltd, 331 Church-street, Parramatta.

Australian Earliana—Rumseys Seeds Pty. Ltd.,

331 Church-street, Parramatta.
Rouge de Marmande—Rumseys Seeds Pty. Ltd.,
331 Church-street, Parramatta.

Red Marhio No. 95—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Beans.

Tweed Wonder—H. P. Richards, "Sovereign-ton," Tenterfield.

#### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:—

Cauliflowers— Hawkesbury Solid White, Nugget, Shorts.

Onions— Hunter River White. Grain Sorghum-

Kalo.

Maise-

Learning, Golden Superb, Golden Glow, Fitzroy, Funk's Yellow Dent

Pumpkins-

Queensland Blue.

Grasses, etc.-

Phalaris tuberosa, Subterranean Clover (mid-

#### Controlled Disposal of the Citrus Crop.

ELSEWHERE in this issue (see opposite page 480) appears an order, issued by direction of the Department of Supply and Development, for the control of Valencia, Seville, Common and Poorman oranges, and of lenions and grapefruit. The only portion of New South Wales excluded from the order is a strip, 25 miles wide, along the Murray River. Fruit from this area is normally marketed through Victorian channels.

The Control Order is designed to ensure that every citrus grower makes an equitable contribution to the needs of the defence forces, which

require heavy supplies of fruit juice.

The Minister for Supply (Mr. J. A. Beasley) appeals to every citrus grower to make out and forward immediately a return of his 1042-43 crop. Upon receipt of this by the Deputy Controller of Defence Foodstuffs a determination will be made immediately of the quota of fruit to be released for ordinary marketing, and of that which must be diverted to factories catering for Defence requirements

The Control Order does not mean that the civilian market will be bereft of citrus fruit. There is no restriction on the supply to the civilian market of mandarins and of the remaining crop of Washington Navel oranges. An immediate release of 10 per cent. of each grower's

crop of Valencia oranges and lemons, and 10 per cent. of the remaining crop of Common oranges of each grower, has been made for the civilian market. From time to time when it has been ensured that the requirements of fruit juice to the forces have been amply covered, a further release will be made for the civilian market.

The control scheme has been launched in close co-operation with the central executive of the New South Wales Citrus Growers' Committee. In each citrus growing area there is a local instructor of the Department of Agriculture, a representative grower and a packing shed manager where such exists. The Central Executive, subject to the Deputy Controller of Defence Foodstuffs will generally superintend the administration of the scheme by the local district fruit growers' committees, which also will be responsible to the Deputy Controller, Defence Foodstuffs.

Local committees are empowered to release fruit where there is danger of fruit spoiling, or where growers desire to supply fruit to factories for the use in execution of orders on behalf of the Department of Supply, even before determination of the ultimate quota of fruit required from each grower for despatch to the factories for use in

the Supply Department's order.

## Carrot Seed Production.

### Experience at Leeton Experiment Farm.

W. R. WATKINS, H.D.A., Farm Manager.

BECAUSE of the importance of carrots, not only for supply in increasing quantities to the fighting forces, but also for the needs of the civilian population, and because of the possibility of interference with the overseas supplies of seed, the Department of Agriculture undertook the production of a small area of carrot seed under commercial conditions at Leeton Experiment Farm in the spring of 1941. The success that attended the venture and the lessons learned are recounted in this article for the benefit of others who undertake the production of seed of this crop.

The soil in which the crop was grown ranged from a red clay loam to a heavy red clay which had been cropped to rice 1939-1940 and the stubble grazed to sheep. The land was watered in early summer and the subsequent weed growth grazed; it was then ploughed and laid out in 3-chain widths from the supply ditch to the drainage channel during the summer. Many

to planting, the roots were graded and the tops cut off within 1 to 2 inches of the crown and all forked, badly-shaped and badly-split ones were rejected.

#### The Cultural Methods Used.

Planting was carried out in mid-August. Furrows were opened 4 to 6 inches deep with winged points set 3 feet apart on a





#### A Crop of Carrots in Flower.

Note the breakwind in the background.

[Photo, by W. Poggendorff.



gradings were necessary to ensure subsequent correct irrigation, and the land lay fallow until planting, prior to which it was deeply tyne cultivated two ways.

The variety used was Red Core Chantenay, and as the roots were obtained from Griffith they were only a few days out of the ground before being replanted. Prior

two-horse cultivator. The roots were planted 18 inches apart by hand in the sides of the furrow, with the crown just below the level of the furrow ridge. As the roots were planted they were pressed into the furrow side perpendicularly and a covering of soil hand-pressed around each root to hold it in position and prevent its being moved in the covering operation.

Superphosphate at 4 cwt. per acre was hand-placed in the furrows. Covering was carried out immediately by throwing a furrow over with a single furrow mould-board plough, which not only made a very effective hill, but left a furrow alongside the row of roots for immediate irrigation. The covering and irrigation followed close on to the planters so as to reduce exposure to a minimum, and to enable the crop to be watered as soon after planting as possible.

An inter-row cultivation followed the first, and also the second irrigation which was given on 20th October. These two were the only cultivations given the crop, as the rapid plant growth prevented any further workings; the plants covered the space between the rows soon after the second irrigation.

No rain of any benefit fell during the growing period and exceptionally dry, windy conditions prevailed throughout, necessitating frequent irrigations to keep the plants in a growing condition. The crop was irrigated, as already indicated, at the time of planting and again on 20th October, and was then given six other waterings at more or less weekly intervals from 7th November to 2nd January.

#### The Crop Made Good Growth.

With the method of planting adopted, the plants were grown on a small hill formed by the furrow opened and the covering with the plough, but owing to the frequent irrigations, the soil from these hills was partly washed away, and owing to the windy weather experienced, together with the immense top-growth made, quite a number of the plants were blown over, especially during the end of December. severe dust storms were experienced, but owing to a belt of timber acting as a windbreak, the damage was not as great as it might have been. Unfortunately during an extra severe storm on 27th December approximately 5 per cent. of the plants were blown over

The plants made excellent growth and averaged approximately 3½ feet in height. The flowering commenced in October and continued through to February. The early formed umbels were the largest and carried the largest amount of and the cleanest

seed. Setting of seed was progressively less as time went on, and the last formed umbels did not carry any seed.

#### Harvesting and Cleaning.

The first seed was ready for harvest on 23rd December and the last on 24th February, 1942. Five pickings in all were obtained, and although the same bulk quantity was secured in the February pickings as in January, the ratio of waste to clean seed obtained in cleaning was exceedingly high, and the seed was smaller and poorer than the January pickings.

At maturity the seed in the umbels had turned from green to a dark grey, with the beard light coloured and quite discernible. Because of this beard the seed holds fairly well together in the umbels when ripe, and does not shatter as does parsnip seed.

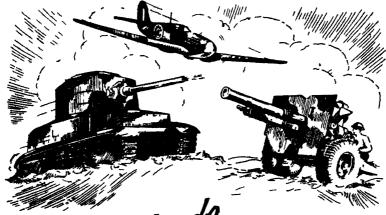
Canvas citrus picking bags were used by the pickers, since this left both hands free. Ordinary pruning secateurs were used for cutting, and the umbels were carried in the picking bags to the ends of the rows and bagged in chaff bags. From the field they were then spread out on the concrete floor in the shed to dry to the stage for threshing and cleaning. It was found necessary to fork over daily these spread out umbels to prevent heating and mould. Hand harvesting was resorted to, owing to the desire to obtain the maximum yield of seed.

Threshing and cleaning operations presented rather a problem. The first operation was to break up the umbels, thus liberating the seed, and this was done by hand feeding it through a small stripper, made stationary, and engine functioned for extra speed of the beaters or blades which were set very close. The threshings from the stripper were then sieved to eliminate the stalks and other large waste. The rubbing off of the beard so that the seed would be free, when cleaned, to run through a small sower, was effected with improvised machinery on the farm, and then further sievings and a winnowing were given.

#### Seed Yield and Quality.

Subsequent sowing in the field showed that the seed gave a high percentage of germination. The area planted was 1½ acres, from which a yield of 592 lb. per acre was harvested, equal to approximately 450 lb. per acre of commercially cleaned seed.

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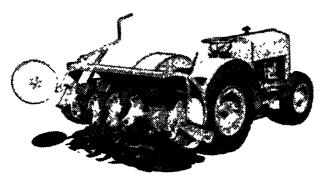
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#### Observations and Recommendations.

The following observations made during the production of this seed crop will be of interest to growers engaged in or contemplating carrot seed production.

- 1.—It is essential that roots be transplanted as soon as possible after digging—the more mature the crops the quicker they wither on exposure.
- 2.—Seed roots should not be over-mature—three-quarters grown carrots are considered the best.
- 3.—The size of the roots does not appear to affect the growth and production of seed, and provided the type and condition are right, smaller ones within reason appear to give as good results as larger ones.
- 4.—The soil must be in good tilth, deeply ploughed and fallowed.
- 5.—For best results transplanting should be done from the end of June to the beginning of August. Seed sown in January and Pebruary should produce roots suitable for transplanting at this period.
- 6. Roots should be correctly placed in the side of the furrow and a covering of soil firmly placed around each root and the roots covered by the soil from the plough. This covers the whole root, thus preventing damage through exposure to weather, usects, birds, etc.; it was noticed that roots rotted quickly after such damage.
- 7.— Protection from high winds is essential, and land should be selected in a protected area if possible. The sowing of strips with some tall growing crops to act as wind breaks may be adopted
- 8.- For inter-row cultivation, the rows should be spaced about 4 feet apart and the roots placed from 18 to 24 inches apart in the furrows.
- 9.—When the plants are about 18 inches high it appears necessary that they should be well hilled, as with maize or potatoes, to help support the large top growth. This is especially advisable on the loamier types of soil where the weight of the top growth alone will cause a falling over of the plants. With furrow irrigation it is essential that a good hill be kept up to the

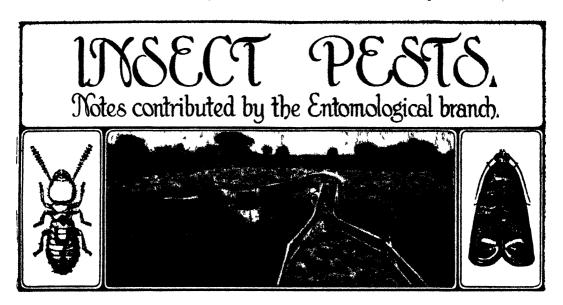
plants, as the soil is always inclined to be washed away to a certain degree, from the rows when irrigating.

- 10.—If extra long roots are being planted, lay them at an angle in the sides of the furrows, instead of placing perpendicularly.
- 11.--Do not permit the soil to dry out, but be careful not to over water, especially in the hot weather, as rotting of the roots is caused in this way and the plants die off immediately.
- 12.—Under normal conditions it may not be advisable to irrigate after plants are well out in head.
- 13.—Do not wait until the later formed umbels are ready, but judge from the main flowering stage when the seed is nearly ripe; then pull up the whole plant.
- 14.—It is essential that threshing be carried out only on a hot, dry, sunny day. It is impossible to thresh out any seed in dull or humid weather.
- t5.—To minimise losses from soil-borne diseases, it is essential to obtain seed roots from first-year land.
- 16.—Where furrow irrigation is used it is essential that the land be perfectly graded and levelled, and that the length of the "runs" or furrows for watering be no longer than 3 to 4 chains. This permits efficient control of water when irrigating and assures the necessary drainage. Over-watering and water lying in low spots causes rotting of the roots at any period from just after transplanting to the ripening of the seed.

#### Oversea Harvesting Methods.

The method of harvesting in America is to pull up each plant when the main seed producing umbels are ripening off, and cart them off on a lorry or cart in heaps held in sheets to prevent seed loss. The plants are then spread out on large sheets on the ground and allowed to dry. When dry, and only on a hor sunny day, a couple of horses or mules coupled to a roller, octagonal for preference, are driven round and round over a deep layer of plants. This operation threshes out the seed and at the same time rubs off the beard. The next operations are the screening and winnowings to obtain the clean seed.

#### War Secrets Spread Like a Bush Fire. Don't Gossip.



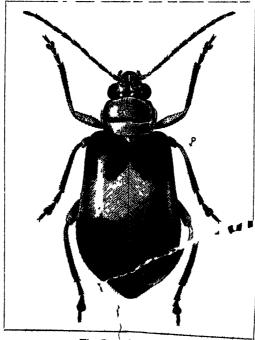
#### PESTS OF CUCURBITS.

THE most serious insect pests of cucurbits are the pumpkin beetle (Ceratia hilaris), the leaf-eating ladybird beetle (Epilachna 28-punctata) and aphids or plant lice (Aphis gossypia and other species). In some seasons red spiders (Tetranychus urticae) and Rutherglen bugs (Nysius vinitor), and in the North Coast areas, the yellow monolepta beetle (Monolepta rosca) may cause serious damage.

### The Pumpkin Beetle.

This beetle occurs in most coastal and inland areas, but is less prevalent in the southein than in the northern parts of the State where, in many districts, it is a pest each year in the carly Every few (lops years however there 15 a general outbreak and heavy infestations occur in most districts

The pumpkin beetle is primarily a pest of cucurbitaceous plants such as pumpkins, melons, squashes, cucumbers, and the beetles may attack the plants at all stages of growth, the chief



The Pumpkin Beetle.

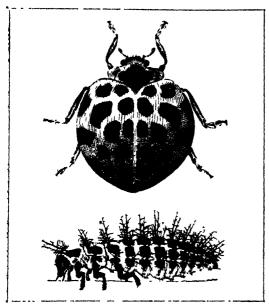
damage occurring to the young plants, especially to those just through ground, these may be destroyed by half-adozen beetles in a few hours In older crops a few individual plants may be badly damaged destroyed, but usually once the plants commence to produce runners they are able to outgrow infestation. Lectles also attack the wers and young flats of pumpkins fru squashes and by and nually destroying cont cause additional these losses

The adult beetle, peasures one-which of an inch in fourth on

length, is of a general rich orange-yellow colour, with four large black spots on the wing covers. Its elongate form readily distinguishes it from the somewhat similarly coloured ladybird beetles which are more or less circular in outline. Under laboratory conditions the period of development from egg to adult is six weeks in summer, and ten to twelve weeks in the autumn and spring. In the field the elongate yellow larvae have only been found on one occasion occurring in the roots and stems of pumpkins. The adult beetles may live throughout the winter.

#### CONTROL.

Protection of Young Plants.—While the plants are very small—for the first three weeks—they can be protected by a daily dusting with either hydrated lime, flour, or



Adult and Spiny Larva of the Leaf-eating Ladybird Beetle.

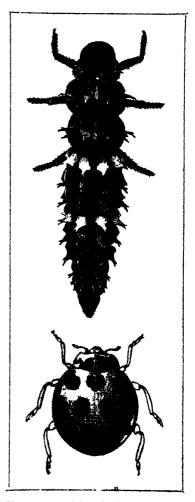
a mixture of equal quantities of lime and tobacco dust. These substances will protect the plants for at least a day, but frequent treatment is necessary to protect the new growth and to renew the old dust covering Particular attention should be given to the plants on warm, calm days following wet or windy weather.

Protection of Well-established Plants.— When the plants become older and do not require such close attention, individual plants, as they become infested, may be dusted with a mixture consisting of pyrethrum powder I lb., kaolin or flour 4 lb. Derris dust may also be used. These dusts will destroy numbers of beetles and at the same time prevent reinfestation for one to two days.

While the plants are small and require treatment at least every other day, pyrethrum and derris dusts would be considerably more expensive than the inert dusts previously recommended. On limited areas, the dusts may be applied by shaking through cheese cloth bags if dust guns are not available.

#### The Leaf-eating Ladybird.

The adults and larvæ of this beetle feed upon the upper surfaces of the leaves, and cause them to become skeletonized and



The 18-spotted Ladybird and its Larva
A beneficial species which, in both larval and adult
stages, feeds on aphids.

withcred. Although this pest is found chiefly upon various species of solanaceous plants such as potatoes, tomatoes, etc., it also attacks pumpkins, melons and other cucurbitaceous plants, and at times causes as much damage as the pumpkin beetle.

The adult ladybird is orange-yellow and closely spotted with twenty-eight, irregular black markings. In general appearance it closely resembles the eighteen-spotted ladybird beetle (*Leis conformis*), a beneficial species which feeds upon aphids or plant lice. This useful species is a brighter yellow, more hemispherical in form and usually very shiny.

The wing covers of the leaf-cating ladybird are not so shiny and have a downy appearance. Its injurious larvæ are readily distinguished from the other ladybird grubs, as they are covered with numbers of branching black spines.

#### CONTROL.

Plants such as pumpkins, melons, squashes, cucumbers, etc., may be protected while they are young by dusting them with a mixture consisting of equal quantities of hydrated lime and tobacco dust. Pyrethrum dust (1 lb.) mixed with kaolin or flour (4 lb.) may also be used. Arsenate of lead should not be used on the young plants as injury or "burning" may occur.

Well-grown plants may be dusted with lead arsenate powder in either a kaolin or hydrated lime filler, using r lb. of lead arsenate powder to 3 lb. of filler. Two applications of these dusts with an interval of ten days is usually necessary.

#### The Melon or Pumpkin Aphid.

This aphid infests most cucurbitaceous plants, but cucumbers, melons and pumpkins are particularly liable to attack. It also infests a wide variety of other groups of plants

This species is very variable in colour and individuals of the same colony may be yellow, pale yellowish-green to dark-green or almost black; while some, also, may be lightly covered with a mealy or waxy secretion. Winged and wingless forms occur.

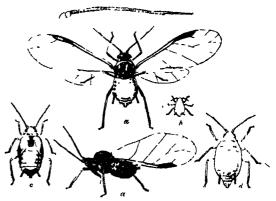
These insects feed by puncturing the tissues and extracting the sap from their host plant, and when abundant may cause drying up, discolouration and curling of the leaves.

#### CONTROL.

Aphids are sometimes kept in check by predators and parasites. Among these are ladybird beetles and their larvæ, lace-wings, hover-fly larvæ and various species of minute parasitic wasps. In some seasons, also, whole colonics of aphids may be killed by a parasitic fungus.

On plants such as melons, cucumbers, etc., they may be controlled by spraying with a nicotine and oil solution diluted in the following proportions:—

Nicotine sulphate . . I fluid oz. White oil emulsion . 6½ fluid oz. Water . . . 4 gallons.



The Melon or Pumpkin Aphid

- a -- Winged vivipaious females
- h Young larva or nymph
- i Last stage nymph, showing wing buds
- d. Wingless viviparous female

After (hittenden

Spraying should be commenced as soon as the aphids make their appearance on the plants, and particular attention should be paid to the undersurfaces of the leaves. It may be necessary to give repeated applications at frequent intervals.

#### Red Spider.

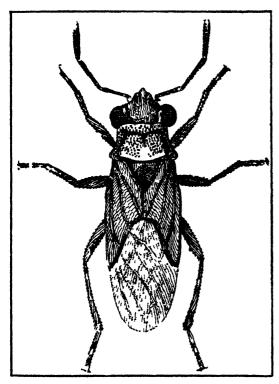
The common red spider is a mite which has a wide range of host plants. These include various weeds, garden and field crops, shrubs, and trees. During dry weather they may cause serious injury to cucumbers, rock melons, pumpkins, squashes, etc.

The mites occur mainly on the undersides of the leaves, where they both feed and spin fine webs over the surface. The leaves become mottled in appearance, due to the innumerable feeding punctures, and when extensively infested may turn yellow and wither.

The adult mites, which are just large enough to be seen without a lens, vary in colour from greenish-grey, with darker side markings, to brick-red. The mites thrive best in hot, dry weather and the life-cycle from egg to adult in summer occupies about nine to eleven days. Many generations may occur during the year, most damage being caused during the months of January to April.

#### CONTROL.

Spraying with a lime-sulphur solution at a dilution of (1 in 100) concentrated lime-sulphur solution—8 fluid oz to 5 gallons of water—will control them. Two applications



Winged Adult of the Ruthergien Bug

of spray with an interval of a week between, are required, and special attention should be given to the undersurfaces of the leaves.

On cucurbits, dusting with lime-sulphur is not as effective as spraying, but in some

circumstances a dust consisting of a mixture of fine sulphur I lb, and hydrated lime I lb., may be used.

Clean cultivation and the destruction of weeds, etc., which may harbour the pest, are important factors in preventing their development and spread.

#### Rutherglen Bug.

In some seasons Rutherglen bugs may occur in vast numbers and become serious pests during mid-summer, young melon vines being particularly susceptible to attack

The adult, winged bugs, which measure about one-fifth of an inch in length, are narrow-bodied and greyish-yellow in colour Both immature and adult stages of the bugs feed by sucking the sap and may cause drooping of the foliage and finally wilting of the plants.

Infestations frequently occur during spells of dry weather when the water content of the soil is low and the plant roots are unable to obtain sufficient moisture to replace that which is lost in the form of sap

#### CONTROL.

These insects may be controlled by dusting either with a pyrethrum dust or with pyrethrum dust mixed just before use with an equal quantity of 212 per cent, income dust. The dust should be applied with a dust gun during the heat of the day and the plants should be treated as soon as the bugs commence to infest the plants.

As the bugs develop abundantly amongst weeds during the early spring, they mainigrate from these to cultivated crops Clean cultivation, therefore, and the ploughing in of all weeds during winter, will assist in reducing later infestations.

#### Yellow Monolepta Beetle.

This beetle has a wide range of food plants and feeds chiefly on the blossoms, tender foliage and young fruits. In the North coast areas of the State, this insect in some seasons causes damage to cucurbits. Although these beetles may occur at any time of the year, they are more prevalent in the spring and late summer months and may swarm in great numbers. Their breeding habits and immature stage are unknown, but they appear to breed in the scrub where the beetles may be found on wattle and the tree blossoms. They later migrate to culti-

vated areas. Their natural tendency is to congregate in swarms on individual plants, and therefore large numbers may be killed with a comparatively small quantity of insecticide.

#### CONTROL.

Control may be effected with a pyrethrum dust or spray. The dust may be prepared by mixing together, thoroughly, I lb. of pyrethrum powder with 2 lb. of kaolin or tale, and the formula for the spray is:—

Pyrethrum powder .. 1 lb.
Soft soap .. 1 lb.
Water .. .. 30 gals.

Mix the pyrethrum into a thin paste with a small quantity of water and make up to twenty-eight gallons. Dissolve the soap in two gallons of water, and add to the pyrethrum mixture.

The action of these insecticides is very rapid and the beetles fall to the ground paralysed almost immediately after contact. It is advisable, however, to make a light application of dust or spray to those beetles which have fallen to the ground.

#### Codling Moth.

(Cydia pomonella.)

Growers are reminded that during this mouth codling moths will commence to emerge from the pupæ of grubs which have overwintered, and are urged not to neglect control measures for the first brood of moths. The emergence usually starts when the trees come into blossom, and may continue for three months.

The calyx spray is the most effective of all codling moth sprays, the object of this spray being to place a deposit of lead arsenate within the calyx cup so that the fruit will be safe from calyx infestation for the whole growing season. The correct time to apply the spray is when approximately 80 per cent. of the petals have fallen and before the infolding sepals have enclosed the calyx cavity. Spraying too early not only gives poor results, but also endangers the lives of bees which frequent the open blossoms.

Every effort should be made towards the elimination of the first brood of moths, and systematic thinning and removal of infested fruits will allow more effective spraying and considerably reduce the number of moths in the second and third broods. The importance of thorough spraying in the calyx and carly cover sprays cannot be over estimated, as these sprays definitely determine the success or otherwise of any codling moth spray programme.

A rapid increase in codling moth infestation during January indicates ineffective control of the first broad and the commencement of heavy second broad activity.

# Fruit Flies in Loquats.

CROWERS, and home gardeners who may have only a single fruit tree, are advised that measures for the control of fruit flies are compulsory under the Plant Diseases Act. The compulsory measures include the use of fly traps or foliage poison baits and the regular destruction of any infested or fallen fruit.

In addition, all loquats grown in the central coastal areas of this State must be removed from the trees by 31st October. At the present time loquats may be infested with fruit fly maggots, and a careful inspection for any signs of attack should be made and the prescribed measures for their control rigorously carried out.

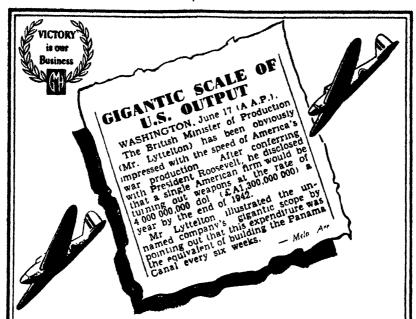
Fruit flies pass the winter in the adult stage, but normally, little breeding takes place during that period, although occasionally fly maggots are found in second crop apples and citrus fruits. Infestation for the new season usually commences in September and becomes still more evident in October.

Loquats are considered to be the main host for this early infestation, although a limited amount of infestation may be found in mandarins, oranges and lemons at this period of the year.

Particulars of the prescribed lures and poison baits may be obtained free on application to the Department of Agriculture, Box 30A, G.P.O., Sydney.

War Gossip is Dangerous.

Guard Your Tongue.



# G.M. PRODUCTION TO BE TREBLED FOR WAR

Since February 11th, 1942, United States automobile plants that turned out 5,000,000 cars and trucks in 1941, have been merged into one gigantic arms production unit — the largest ever put together.

Interviewed in New York recently, Mr. C. B. Wilson, President of General Motors said "G.M. has agreed to produce 40% of the plane engines for the Army, 25% of the tanks, half of the trucks, a third of the machine guns and half of the Diesel engines for the Navy. To meet its schedules, General Motors, which averaged a productive rate of one billion 500 million dollars over the past five years must push towards a rate of four billion dollars by the Spring of 1943."

In Australia the 10,000 men and women who are General Motors-Holden's are also producing large quantities of war material, including aeroplane engines and parts, guns, pontoons, shells, bombs and many types of army vehicles.

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# PLANT DISEASES



# Notes contributed by the Biological Branch

Division of Science Services



#### **ERADICANT SPRAYS**

For Apple and Pear Black Spot.

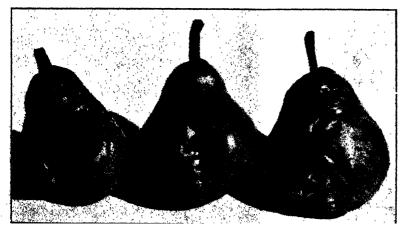
FOR some years investigators in the U.S.A. have been experimenting with new types of fungicidal sprays which they term "eradicant sprays." These were first directed towards the control of black spot disease of apples and pears, but their use is being extended to a number of other diseases, and the results so far are most promising.

The object of the spray is to kill the fungous material, which would be the source of infection for new season's growth, during the dormancy period of the host. This is necessary because the chemicals used would be too destructive to use on foliage. The cheapest and most effective of the eradicants has proved a 0.1 per cent. solution of sodium dinitro-ortho-cresylate,

a preparation of which is sold in U.S.A. under the name of "Elgetol."

The favourable results obtained overseas have been confirmed here by some experiments on the control of black spot of apple and pear, carried out last spring by Mr. H. Parry Brown, Plant Pathologist.

Sodium dinitro-ortho-cresylate is available here in oil solution as a winter spray



Black Spot of Pears.

Williams pears showing large primary spots resulting from early infection, and the smaller secondary spots which follow later infection.

for insect control. This was used in the spray trials, the oil being broken down to give the desired concentration of 0.1 per cent. sodium dinitro-ortho-cre-ylate. This was applied at the rate of 400 gallons per acre, at the "green tip stage" as a "floor" spray to the leaf refuse, which normally provides the inoculum for the infection of young leaves and fruit.

It was found that there was a reduction of 83 per cent. in the number of spotted pears and 47 per cent. in the number of spotted apples in the sprayed as compared with

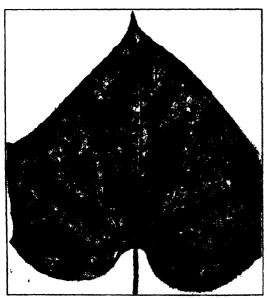
the unsprayed blocks, and also that the number of spots per fruit was less in sprayed blocks. In his report, Mr. Brown has emphasised that the floor spray alone is not in itself a complete answer to black spot, and that it should be regarded only as supplementary to the normal protective spray programme.

A further point is that, to be effective, a minimum of 2 acres must be given the floor spray, as the wind dispersal of fungous spores from unsprayed areas would tend to nullify the effect of the eradicant if only a part of the orchard were treated

#### Diseases of Cucurbits.

#### Mildews.

CUCURBITS are subject to two mildew diseases—powdery mildew and downy mildew. Both are prevalent during warm, humid weather, but powdery mildew can also develop under relatively dry conditions.



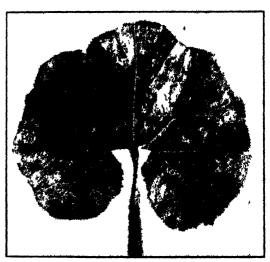
Downy Mildew of Cucumber.

After Weber

The powdery mildew fungus attacks all varieties of commonly cultivated cucurbits, but most severe injury is caused to rockmelons, cucumbers, pumpkins, squashes and marrows. The first visible signs of the disease are white powdery spots on the shaded portions of the main stems close to the soil, and on the undersurfaces of the older leaves. Later the spots may coalesce

and cover the whole leaf surface. Once established the disease spreads rapidly throughout the crop. In dry hot weather, affected leaves wilt and die quickly and the growth of the vines is checked, and the fruits which are suddenly exposed to the sim are frequently scalded.

The downy mildew fungus also attacks all cultivated cucurbits, but as a rule only



Powdery Mildew on the Under-surface of a Pumpkin Leaf.

cucumbers and rockmelons are injured seriously enough to cause losses. The disease appears as more or less angular yellowish spots on the leaves, and on the lower surface of these a rather scanty white downy growth develops. The individual spots are rarely over ½ inch in diameter, but may coalesce, resulting in the ultimate death of the whole leaf.





Control.—Mildew can be controlled in the case of pumpkins, squashes and marrows by dusting the plants with sulphur at weekly intervals.

Rockmelons and cucumbers should be sprayed with Bordeaux mixture (3-4-40), at weekly intervals from an early stage. Both these species are subject to injury following sulphur application, especially in hot weather, and in addition copper sprays are more effective than sulphur in combating downy mildew, which is the more serious on these crops.

It is important that the spray or dust should reach the under as well as the upper leaf surfaces.

#### Mosaic.

Mosaic is caused by an infectious virus and is transmitted from diseased to healthy plants by aphids. The most conspicuous symptoms are dwarfing of the plants and mottling and distortion of the foliage, but this is not shown by leaves which develop during the hotter summer months. The only signs of infection then may be loss of vigour in comparison with healthy plants, and inconspicuous pale areas in the leaves. Cropping is also affected.

In addition to cucurbits a number of other cultivated plants and some common weeds can become infected with this virus.

Control.—Outbreaks of mosaic usually originate from infected seed. Seed should, therefore, be saved from healthy plants only. Where the origin of the seed is not known, sow more than is required for each

hill, and hoe out any backward or abnormal seedlings early in the season. Because of the possibility of their acting as hosts, weeds should be kept down as far as possible

#### Anthracnose.

This fungous disease sometimes causes serious losses in waterinelon crops. Rock-



Melon Affected with Ripe Rot or Anthracnose.

melons and cucumbers are also affected. Sharply defined, reddish-brown to black circular spots develop on leaves, leaf petioles, stems and fruit. The affected leaf tissue usually dies, becoming black and shrivelled. A badly infected crop may have the appearance of having been burned. On the fruit the spots coalesce to form large disfiguring Lesions and a dry rot may follow. On

where possible, and if any doubts exist as to the origin of the seed it should be dusted with a fungicidal dust.

Crop rotation should be practised. In districts where the disease is usually important, spray the crop three or four times with Bordeaux mixture (3-4-40). Apply the first spray when two or three leaves have developed, the second just after the vines



both fruit and stem lesions, light-pink masses may develop, due to the profuse formation of spores by the tungus. Losses may also occur in transit as fruit from infected vines, though apparently healthy at the time of picking, may subsequently develop lesions

Control —The disease persists on crop refuse and is carried on the seed Seed from clean fruit should, therefore, he used have started to run, the third about a week after the first melons have set, and the fourth two or three weeks later.

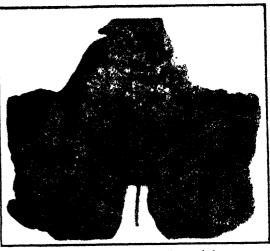
#### Fusarium Wilt.

This disease, caused by a soil inhabiting fungus, is widespread and important in watermelon crops. The plants may be attacked at any stage from seedling to

maturity, and according to the time at which the infection occurs, it causes a rot of seeds in the soil, damping-off of seedlings, stunting and wilting of the young plants and wilting and gradual death of older plants. If the stem of an infected plant is cut, a brown discolouration of the woody parts can usually be detected.

Control.—Once introduced into the soil the fungus will persist there for years. It is introduced to new areas by the use of infected seed as the disease is seed borne Only seed from uninfected crops should be saved, and suspected seed should be dusted as recommended for anthracoose.

If the soil is infested, use the variety Hawkesbury Wilt Resistant.



Cucumber Lesf, showing Diseased Areas Caused by the Anthracuose Fungus,

### Selected Citrus Buds.

### The Co-operative Bud Selection Society, Ltd.

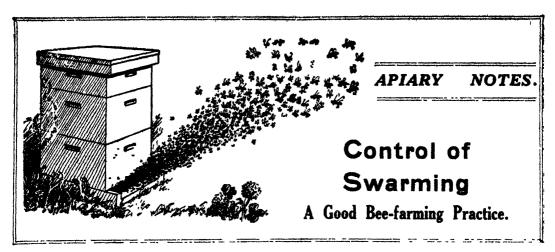
FOR some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, truits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruitgrowing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1041 budding season, trees from which should be available for planting during the 1042 season:—

during the 1941 budding season, trees from which should be available for planting during the 1942 season :-

	Washing- ton Navel.	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lisbou Lemon.	Emperor Mandarin.	Total.
Adamson, T, Ermington	4,000	4,000		2,000	•••		10,000
Cambourn, H, Gosford	3,500	5,000		3,000	•••	•••	11,500
Catt, F. D. Carlingford	3,000	3,000		3,000	1,000		10,000
Eyles, A T., Rydalmere	5,000	5,000	1,000	2,000	•••		13,000
Ferguson, E. H., Wyong	1,000	1,500	i	500	•••		3,000
Ferguson, F., & Son, Hurstville	2,500	2,500	1 1		•••		5,000
McKee, Geo, Rydalmere	1,500	1,000		1,000	1,000		4,500
Rosen, L. P., & Son, Carling-	-	-	!			]	
ford	10,000	15,000	2,000	5,000	1,000	800	33,800
Smith, W., Rydalmere		•••		2,000	•••		2,000
Spurway, F. E. & Son,	ļ		1			1 1	
Ermington	3,500	<b>5,0</b> 00	750	500	250		10,000
Swane Bros., Ermington	5,000	2,000	1,000	1,000	1,000	800	10,800
	39,000	44,000	4.750	20,000	4,250	1,600	113,600

Keep On Buying War Savings Certificates.



W. A. GOODACRE, Senior Apiary Instructor.

THE early-season operations in the apiary—up to this month—have been mainly directed towards giving assistance to the colonies to enable them to become established in strength. Having attained this, it is most important that swarm-control measures be practised to hold the colony strength, so that the best results may be gained in production of honey and beeswax. It must be realised that a colony, which divides its population by swarming, must devote a considerable amount of time during the early honey-flow to re-establishing itself, thus incurring a loss in its productivity.

If the bee-farmer be fortunate enough to be present when a swarm issues and to secure it, this swarm may assist in making up some of the lost leeway in production, but it, also, must effect a good deal of comb-building work to provide for brood-raising and honey storage before it may be counted as a satisfactory unit in the apiary.

Again, the spirit of the hive at the time, due to the influences which induce swarining, is such that the production of surplus honey becomes a more or less secondary consideration with the bees. It may be, too, that the bee-farmer does not desire increase in this way, or at the time selected by the bees, and there is always considerable risk of losing the swarm.

The control of swarming is, therefore, a very important factor in good bee-farming practice.

#### Distribution of Colony Strength is Essential.

The chief factors in swarm control are the provision of ample super accommodation, and the adoption of measures that ensure that each section of the hive offers inducement to the bees for complete occupation, thus effecting distribution of colony strength.

It will be found that supers of combs are more attractive to bees at this period of the year, than supers containing frames fitted with comb-foundation. The need for building-up a good store of combs during a honey-flow, and recommendations covering the care of supers of combs through the winter for this and other essential requirements, have been given prominence in previous issues. The best position on the hive for a super containing frames of combfoundation, is under another one already occupied by the colony. Many beginners make the mistake of placing a new super on top, without providing any inducement to the bees to commence work in it. Little relief from congestion is afforded in such a case, and the bees are inclined to develop a tendency to swarming. Where a super of foundation has to be used for the first addition over the brood chamber, a drawn comb or two should be inserted to induce the bees to commence work, or, as an alternative, when spare combs are not available, a couple of established frames from each side of the brood-nest downstairs, may be transferred to the new super. This alternative plan may be applied, even where shallow-depth supers are used, by allowing the lower portion of the frames to hang down into the

space they previously occupied in the brood chamber. The necessary re-adjustment of the frames may be made as soon as the colony has commenced comb-building in the super.

Avoid Congestion.

Brood-frames containing an over-supply of honey tend to restrict a full extension of brood-rearing, and may give rise to congestion and a desire for swarming. This condition is often found in hives following the working of a winter flow of honey. To afford relief a couple of the honey-logged combs may be moved up to the first super and replaced by empty ones suitable for



A Clustered Swarm is Handled Without Fear.

brood-rearing work. In some cases the congestion may be relieved by judicious use of the honey-extractor.

When a honey-flow of sufficient intensity to induce the bees to concentrate on storage work and reduce the tendency to swarming, is delayed, and intense brood-rearing is still proceeding in the hive, a measure of relief may be obtained by removing combs with emerging brood from the more populous hives, and giving them to weaker stocks. A number of nuclei colonies may also be made if accommodation is available for them.

Other important means of reducing swarming to a minimum are the provision of ample hive-entrance ventilation and the working of young Italian queen-bees. The breeding-stock should be selected for its non-swarming qualifications.

#### Securing Stray Swarms.

When the bee-farmer is travelling about at this time of the year, it is not unusual for him to find a swarm of bees clustered near the roadside, or to receive advice from a farmer friend that there is a swarm on his property which he desires removed. In anticipation of securing stray swarms in this way, it is a good plan to carry a good sound chaff bag and a piece of string, in the back of the motor vehicle used in apiary work. In most instances a swarm will cluster on a branch of a small tree or shrub, and it is a very simple matter to open the bag and work it over the swarm, then tie firmly with string. The branch is cut off with a pocket knife, or small saw from the tool-box, the portion of the branch where the bag is tied being held securely during the cutting operation, so that the bees will not be disturbed or allowed to fall. transporting the swarm home, tie the bag on the shaded side of the lorry where ample fresh air is available; if necessary, such a swarm may be carried a lengthy distance.

The chaff bag may be used also when a swarm is found clustered on a post, tree trunk or such like difficult position. Fold the bag to about half its length, and place m it a few branchy twigs to keep it open. Then, with the aid of a billycan or cup from the tucker box, scoop the bees into the bag

The use of chaff bags in this way saves the carting about of screened boxes which may often get in the way where space counts in general apiary transport operations.

#### Housing the Swarm.

In preparing to hive a swarm it should be taken into account that the bees are not expecting to find a home all furnished with drawn combs and honey. The swarm is prepared to make a fresh start in new quarters offering ample scope for future extension work. A swarm should be housed in a clean, well-prepared hive containing frames with full sheets of comb-foundation, and one frame of brood containing some young larvae and eggs. The young brood,

demanding the immediate attention of nurse bees, tends to make the colony contented, whilst the remainder of the frames of foundation offer ample scope for the full employment of the remainder of the force. As a swarm of bees enters the hive en masse and proceeds to comb-foundation, it requires that each sheet must be very firmly attached to frame top-bar or a good non-stretching wire fitted very close up to the top-bar. For the proper attachment to a wire it is necessary to employ an electric embedder.

#### The Placing of Brood Combs.

A good deal of importance is attached to assessing the value, for brood-rearing, of each brood frame, and also the order in which they should be placed in the hive. The best two combs, those containing the greatest amount of perfectly constructed

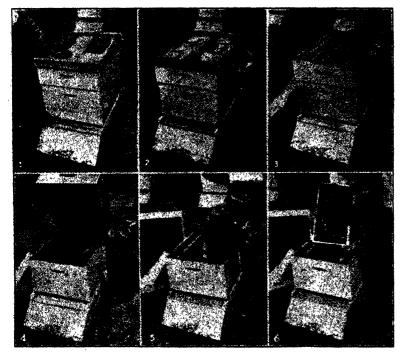
worker cells, should be placed in the centre of the brood-chamber, and the others in their order of merit on each side, so that the two poorest combs for producing worker brood should be right on each side wall of the hive body.

#### Carelessness is Responsible for the Spread of Brood Disease.

It has been said that "The worst disease bees suffer from is ignorance on the part of the bee-farmer," and from experience with "A.F.B." (Bacillus larvae) disease in this State, much may be said in support of this claim. In nearly every case where an out-

work, it is soon brought under notice of the Department and prompt measures are taken to suppress it and trace the source of the trouble.

It is not beyond the interested beginner to recognise the abnormal appearance of the

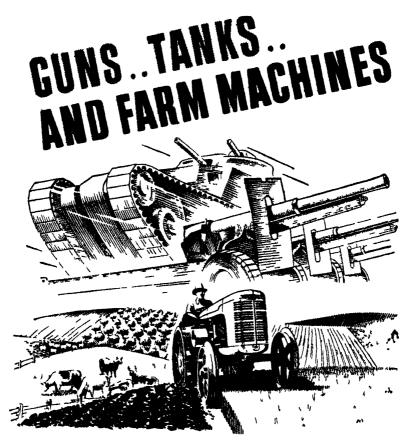


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#### Inspecting the Hive

- 1.-Smoking the hive.
- 2.--Removing the top.
- 3 .- Inspecting the super.
- 4.—Removing the super.
- 5.—Removing broad frame.6.—Inspecting broad.
- U.S.A. Dept. Agric. Block.]

break of the brood disease has been located, the source of the infection has been traced to downright carelessness or disinterested inexperience on the part of some beekeeper. Where the disease is spread to an apiary managed by anyone interested in his brood associated with "A.F.B." disease. The sprinkling of discoloured cappings, usually sunken a little, and the brownish mass of the dead larvæ, which is of a stringy nature, are the significant symptoms of the disease.—(Continued on page 489.)



#### ● VITAL ARMAMENTS IN AUSTRALIA'S WAR EFFORT

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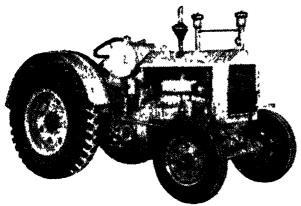
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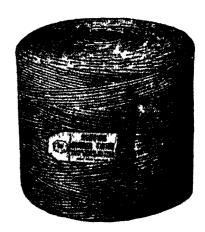
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#### FRUIT GROWING FEATURE . . . . FOR OCTOBER . . . .

### THE CUSTARD APPLE.

H. W. EASTWOOD, H.D.A, Special Fruit Instructor.

Although there are many species of the family Annonaceae, only four have attracted much attention in Australia, namely:-

(1) The Netted Custard Apple or Bullock's

Heart (Annona reticulata).
(2) The Prickly Custard Apple or Sour Sop (Annona muruata).

(3) The Scaly Custard Apple or Sweet Sop or

Sugar Apple (Annona squamosa).
(4) The Cherimoya or Peruvian Custard Apple (Annona cherimola).

Experience over a period of years has shown that the first three species are more adapted to and thrive better in the tropics, whereas the Cherimoya custard apple, besides being a better commercial type of fruit, is more suited to the sub-tropical conditions of the North Coast district of this State. This variety is dealt with in this article; it is essentially a dessert fruit and only grown commercially in a small way

#### Suitable Climatic Conditions.

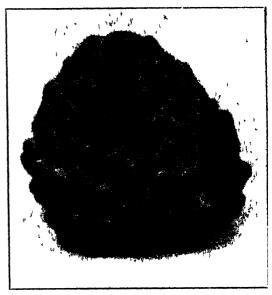
Suitable climatic conditions are more important than other factors for successful fruit production, and to a lesser extent, tree growth. This tree grows better on the North Coast on the undulating lands in close proximity to the sea, than situations a little further inland where autumn and winter temperatures which cause chilling and frosts, are usually experienced yearly. Rainfall is more frequent and heavier near the coast, and this, together with less variation in temperatures and relatively higher humidities, is more conducive to fruit setting, development and maturation.

Broadly it may be stated that the custard apple does well under conditions similar to those where bananas are cultivated with success, but the Cherimoya can withstand lower temperatures than bananas after the fruit is harvested and before blossoming commences. It is advisable to plant this tree above the frost line.

#### A Shy Bearer.

Notwithstanding that custard apple trees grow well and flower profusely, they more often than not bear light and irregular main crops of fruit and are shy bearers. This phenomenon has con-cerned growers of this fruit for years past, and has influenced them against expanding their areas and given no encouragement to others to plant this tree.

It has been recorded\* that although the flower is perfect, there is no floral mechanism for pollination, and that the male and female reproductive



Custard Apple.

parts do not mature at the same time, which makes self pollination impossible and cross pollination necessary. The primitive structure of the flowers, together with lack of attractive colour, excludes bee pollination.

Observations disclose that the flowers are not visited by various and numerous pollinating insects, and it is presumed that moths and flies do most of the pollinating. The scarcity of do most of the pollinating. The scarcity of pollinating insects is one reason for shy bearing

The flowers do not produce an abundance of pollen, but when fresh and viable, it is sticky. The carpels are short lived, and the stigmatic surface soon dries up under hot, dry conditions These conditions are often experienced during late spring in this district, and they coincide with the main blossoming period of this tree, and are therefore harmful to general tree performance and cropping

#### Time of Flowering Influences Fruit Set.

The long-stalked and pendulous flowers, which are greenish-yellow in colour with thick outer petals about an inch long, develop in succession,

<sup>\*</sup> M. S. Ahmed.—" Polination and Selection of Annona Squamosa and Annona Cherimola." Bul. 157, Mm. of Agr.. Egypt.

and in large numbers if the flowering season is prolonged. Those which appear singly on the extremities of the branches and which are very exposed, together with the weaker flowers of the clusters that commonly appear on the twigs, and those on wood of current growth are not of much importance, as they are usually shed by the tree. Even if they set fruit, it generally withers and drops later on



A Well-grown and Well-shaped 6-year-old Custard Apple Tree in Full Foliage.

The flowers which appear during the usual flowering period in October and November on the lower and more sheltered parts of the tree and on one-year and older wood (provided they set) develop quicker and produce the best fruit. These fruits enjoy a more humid atmosphere, their stalks thicken rapidly and draw sufficient nourishment and they escape injury from sunscorch. If only a small number of the main blossoms set fruit, due to reasons previously explained, subsequent flowers may be produced right into February.

#### Factors Affecting Quality.

Fruits tha set in October and November are usually picked in April or May. They develop during a period of the year more favourable to growth than the period of development of fruit set in January or February. Early fruit setting influences the quality as well as the size of the fruit. If early grown fruit is picked at the right stage of maturity, the flavour is excellent, and such fruits usually bring higher prices on the market. They have fully developed seeds which give better germination.

The time of setting, although most important, is not the only factor which influences the size and quality of fruit. Uniform humidity and warmth encourages the growth of the Cherimoya, and soil fertility also influences the size of the fruit.

Fruit from later blossoming may have to be picked before full maturity to avoid damage from chilly night temperatures. Such temperatures check the growth, and the fruit turns a bluish colour which later changes to black, and then the fruit withers and dies.

the fruit withers and dies.

Well developed fruit, if picked before being chilled, can be ripened artificially, but the flavour is not entirely satisfactory. Fruit which has not reached a reasonable stage of development cannot be ripened by artificial methods: this fruit develops a bluish-black colour and shrivels. The mtensity of the dark colour varies according to the degree of ripening at the time of picking; however slight the discolouration is, it renders the fruit relatively unfit for marketing.

Sufficient reasons have been advanced to explain that it is necessary to obtain regularly a good setting of fruit from the first blossoming to make a success of custard apple growing. Natural agencies cannot be relied upon to achieve this setting, and it is not practicable to practise hand pollination which would secure annual good crops of fruit from the early blossoms. Flowers on the extremities of branches and the weaker ones of the clusters that appear on twigs could be used for hand pollination without effecting the future crop of the trees.

#### The Fruit.

The Cherimoya fruit is formed of numerous carpels, and may be heart-shaped, conical, oval or somewhat irregular in form. It is not uncommon to find fruits that have developed on one side only, or are badly misshapen. Such a condition is usually due to inadequate pollmation of the carpel complement.



Close-up of Limb, Carrying Well-developed Fruit.

The fruit is light-green in colour when ripe, has a thin and delicate skin and weighs from ½ to 5 lb. The flesh is white, fairly juicy and melting with a sub-acid flavour which is delicate, sweet and rich. Numerous black and brown seeds the size of a bean are scattered throughout the flesh. (To be continued.)

### Re-working Apple and Pear Trees.

(Concluded from page 423.)

H. Broadfoot, Chief Fruit Instructor; and E. (. Whitlaker, Packing and Grafting Instructor.

THIS article commenced in the August issue and was continued in September. To date the authors have dealt with the general principles of re-working, and described the re-furnishing method, giving details of the three grafts used in this work. In the present issue, they deal with such other grafts as the strap, bark, wedge, and whip and tongue.

#### The Strap Graft.

The strap graft is an improved type of bark graft; the stock wounds heal over much more quickly and there is little chance of wind damage, as with ordinary bark grafts. It takes a little longer to prepare the scions and the stock, but the advantages are well worth the little extra trouble. Strap grafting is eminently suitable for the ends of the limbs when re-furnishing, and for large cuts such as result from stump grafting. In the latter case, it is mostly used with supplementary bark-grafts to ensure quick callousing of the wound.

The principal cause of failure with strapgrafts is cutting the strap too thin, and care should be taken when cutting to see that a good slice of wood, as well as bark, is incorporated in the strap.

Two methods of preparing the scions are shown in Fig. 12, but generally speak-

 $\log_{10}(b)$  is by far the simpler and is quite satisfactory in It is practice as (a). and much easier quicker to tack the strap to the top of the stock with small panel pins than to criss-cross the ties; in fact with small limbs. and provided the strap sits down flush on the cut surface, neither tacking nor criss-crossing of the ties over the strap is necessary.



Fig. 11.—A Strap-grafted Stump.

Note how the ends of the limbs have calloused completely over at the end of the second season.

#### The Bark Graft.

The bark or rind graft is probably the simplest graft of the lot, and consequently is most popular. The bark of the stock is split down for an inch or so, and loosened at the top to allow entry of the action. The scion is prepared by making one main sloping cut about 1½ inches in length, and then taking a thin slice of bark and wood from the back of the point of the cut, thus making a chisel-like point which facilitates pushing the scion down between the bark and the wood of the stock.

The scion is then pushed home, tied tightly and sealed. This style of grafting is best done when the sap is flowing fairly freely

#### The Wedge Graft.

This is an excellent graft for small limbs. Although once used extensively, it is not so suitable for large limbs as a combination of strap and bark graft, owing to the danger of wood rot following the accumulation of water in the split, with consequent decay of the heart of the limb.

The limb to be grafted is cut off where desired, and split across the cut surface the scions are cut wedge-shaped, with the outer edge a shade thicker than the inner one so that the stock will hold it firmly at the point where the union takes place; i.e.,

the cambium layer between bark and wood When inserting the scion, care must be taken to see that the cambium layer of both stock and scion are in contact. After insertion, the graft should be tied and thoroughly sealed

## The Whip-Tongue Graft.

This is the most popular method of working over all kinds

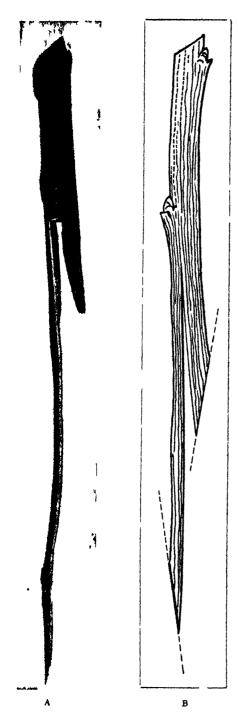


Fig 12 -Prepared Strap Grafts

of nursery stock and root grafts; if it is well done it results in a very strong and almost perfect union.

The stock is prepared by making a flat sloping cut from 1½ to 2 inches long, and then at a point about a third of the way down from the top of the main cut, another shorter cut, about ¾ to ¾ inches long, in the opposite direction



Fig 13.—Strap Grafting
the scion in position at the end of a limb prior to
tying and waxing

The scion is prepared in exactly the same manner, and stock and scion are then joined together by inserting the tongue of the scion into the cleft on the stock and forcing them firmly into place. If stock and scion are approximately the same diameter, a very neat join will result, but if the stock is larger than the scion, the latter should be placed over to one side of the stock cut in order that the cambium layers of both may

be in contact on that side at least. When in position, the graft should be tightly tied and effectively sealed.

### Stump-Grafting.

In view of the cost and time involved in re-furnishing, many growers still choose to convert their trees by the old method

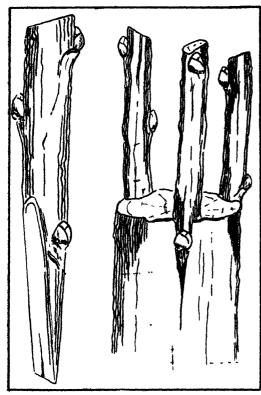


Fig. 14.-The Bark Graft

of stump-grafting, and although, as mentioned earlier in this article, the widespread incidence of *Polystictus*, etc., during late years makes this something of a risky procedure, it is still possible to make a satisfactory job of the conversions by this method, provided a few simple precautionare taken.

In the first place, the stock tree should be de-headed reasonably high—say, 2 to 3 feet above the fork, according to the nature and growth of the tree—and all lateral growth, spurs, etc., below the cuts should be retained to provide as much leaf surface and shade for the butt as possible for the first year or two, or until the new grafts have attained a fair amount of growth.

As wood-rot fungi gain entry to a tree through wounds, the aim should be to get the saw-cuts, etc., healed over as quickly as possible, and to that end plenty of scions should be used, and wherever possible the strap-graft should be utilised owing to its quick callousing properties.

On small limbs up to about 2 inches in diameter, one good strap-graft should suffice, but on cuts up to 3 inches or 4 inches across, a strap-graft, supplemented by several bark-grafts placed about 2 inches apart, is necessary to ensure that the wound is calloused over within a reasonable period.

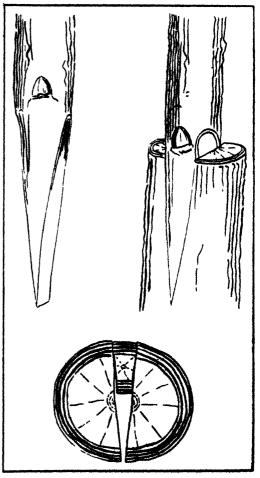


Fig. 15 .- The Wedge Graft.

Once the healing-over process is complete, any superfluous grafts may be removed. Up to this time, they should be merely suppressed by slightly harder cutting than the selected main shoots.

Following grafting, vigorous growth usually arises from the spurs, etc., retained below the grafts, and from time to time this growth should be cut back in order to keep it below the level of the new scions.

grafts should be able to furnish all the foliage necessary.

Over-heavy pruning of the young grafts for the first year or so is not advisable, otherwise the quick callousing of the wounds



Fig 16 Tree Cut Back and Prepared for Whip-graft

If such growth is allowed to develop unchecked, it will ultimately grow above the grafts and seriously retaid their growth

After the first season, this lower growth may be thinned out by cutting away the stronger shoots all wounds resulting from this process being immediately partied over with a suitable material. After the second or third year, practically all this lower growth may be removed, as by then the



Fig 17 —A Stump-grafted Tree

Note the number of scious used and foliage left

B below grafts

may be unduly retarded. It should be realised that the quicker the stump gets a fair sized head on it again the better for the root system, and the free in general. An inspection of the grafts should be made from time to time, and if the slightest sign of invasion by wood-rot fungi is detected, measures to counteract it should be undertaken immediately.

### Use of Septic Tank Effluent on Vegetable Crops.

THE Department of Public Health has furnished the following statement as to the dangers of using septic tank effluent for irrigating vegetables intended for human consumption—

(1) Danger of soiling the hands of the person utilising the effluent for watering vegetibles. The effluent may contain disease producing bacteria, and the hands of the user may become contaminated in this way.

(2) Danger of contaminating vegetables which would in the ordinary course of events later be

cooked legetables such as carrots and swede turnips may be grated and consumed in the law state and there would be a possibility of infection by this means. The possibility of conveying infection by the outer leaves of cabbages, etc, is considered remote and unlikely.

(3) Salad vegetables should, in no circumstances be irrigated with septic tank effluent owing to the likely danger of conveying infection directly by this means

#### COMMONWEALTH OF AUSTRALIA.

### NATIONAL SECURITY (General) REGULATIONS. CONTROL OF CITRUS

In pursuance of regulation 39 of the National Security (General) Regulations and all other powers me thereunto enabling I GEORGE MAN DAVIS, a Beligate of the Minister of State for Supply and Excelopment under the Said regulation 39 HEREBY ORDER as follows —

4 itution Definitions

Prohibition against sale. etc Compliance with directions Revortition etc of directions Returns f ilse statements Comment

1 This order may be cited as the Control of Citrus Fruits Order
2 In this Order unless the contrary intention appeara—
Citrus Fruits means citrus fruits of all types and varieties except navel oranges and mandarins

Citrus Finits means citrus fruits of all types and varieties except navel oranges and mandarins.

Controller means the Controller of Defence Foodstuffs and/or the Deputy Controller of Defence I oo Istuffa in the State of New South Wales and includes any person or body authorised by the Controller to the purposes of this Order.

Grower means a person regized wholly or partly in growing in the State of New South Wales citrus fruit for purposes other than for his own domestic consumption but shall not include any grower engaged wholly or partly in growing Citrus Fruits in that near of the State of New South Wales extending for 2 miles in a northerly direction from the North bank of the River Murray.

3 A grewer shall not seel supply distribute deliver remove or otherwise dispose of citrus fruit except under the authority of and in accordance with directions given by the Controller in that behalf from fin to time.

4 Where any direction is-green by the Controller in pursuance of paragraph 3 of this Order the grower or growers to whom such direction is given shall comply with such direction in every tespect.

Any direction issued by the Controller pursuant to this Order may from time to time be a grower shall on or before a late fixed from time to time in that behalf by the Controller in relation to citius fruits.

A preson shall not make my late statement in any Return or Estimate or purported Return or Estimate for purported Return or Estimate for purported Return or Estimate of the State of New South Wales but shall not include that area of lind in the State of New South Wales extending 2 miles in a northerly direction tion the North lank of the River Minist. The Order shall come into operation in the WELFTH day of SEPTI MBER 1042.

DATED this I WELFTH day of SIPH MBER 114'

(Sgd) G A DAVIS DITEGATE OF THE MINISTER OF STATE FOR SUPER AND DEVELOPMENT

"The Deputs Controller of Defence Poolstuffs Ati B | Richirds his authorised the Central Executive of the "NSW Citrus Fruit Growers Committee and Focal District Citrus Fruit Growers Committee to act subject to his direction with the Jowers of a Controller under the Oriental Executive will generally superintend the administration of the scheme by the Toral Council.

### NEW SOUTE WALES CITRUS PRUIT GROWERS COMMITTEE.

### CENTRAL EXECUTIVE M.S.W. CITRUS PRUIT GROWERS COMMITTEE.

C Products Coop Distributing Society 1 td B x 86 Post Office HAYMARKET Phone M 4484 After hours I A 1642 C Costord Coop Citius Picking House 1 td (OSEORI) BLICK John William Penu Chairman

LNTICNAP, Ambrose Georg. MIA

CHALLIS William Windsor

Francis Joseph M.I.A. I. John Wesley MICHELL

OTRIMBUI FRILBURN, Hubert John (Managet) ARNALI Mountford Returnont (Grower) ARNOI, Arthur Cornelius (Fruit Inspector)

Phone Gosford 114 After hours Gosford 140
Littement House SYDNA
Phone B 2811 After hours FX 662
Pitiment House SYDNAY and COSTORD
WINDSOR Phone Windsor LOCAL DISTRICT GROWERS COMMITTEES

GOSFORD

(HAIIIS William Win Ison (Manager)
SCOTI Geeil Stauler (Manager)
(OLMAN Roger (Grower)
I EASK Austin Gordon (Grower)
WOOD, Roy (Funt Inspector)

OF DIFFERENCE

WINDSOR Phone Wind
WOOD Anthony Burelay
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Phone

(brun Juspector) WINDSOR

ARNOI, 4thut Cornchus (Four Inspector)

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MURRAY Thomas (Manager)
CALDWFLL William (Grower)
ARNOT, Athur Cornelius (Fruit Inspector)

FAGAN Victor Stanley (Director)
FRONSDON, Reward Percy (Grower)
WOOD, Roy (Fruit Inspector)

TOWNSFND William Francis (Manager)
NEWTON Valentine Field (Manager)
HARRISON Russell Mervyn (Grower)
HAYDLN, Jack Norman (Fruit Inspector)
GRIFFITH
MALLINSON, Randolph (Manager)
WARD John Edward (Grower)
BOTTRELL, Petcy Clarence (Fruit Inspector)
Full particulars regarding the administration of the Control Order can be obtained from the Members of the Control Executive N SW Fruit Growers Committee on trong any of the Members of the Local District Citrus
Fruit Growers Committees, or from the Deputy Controll Defence Foodstuffs, Dymock's Building 424 George

KICKILSS Harrold Ernest (Grower)

RICKILSS Harrold Ernest (Grower)

SPINES William Henry (Fruit Inspector)

BROW Marshill (stower)

VINCIN 1 Afred Frederick (Grower)

SPINES William Henry (Fruit Inspector)

HABERT Front (MINGRA ION)

BROW Marshill (stower)

SPINES William Henry (Fruit Inspector)

HABERT Front (MINGRA ION)

MICHTEL John Wesky (Grower)

RICKILSS Harrold Ernest (Grower)

SPINES William Henry (Fruit Inspector)

MOORI AND

BROW Marshill (stower)

SPINES William Henry (Fruit Inspector)

MOBBS Thomas Fdward (Grower)

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### Agricultural **High Schools**

THE Department wishes to call attention to the facilities provided by the Huristone, Farrer Memorial and McCaughey Memorial Agricultural High Schools.

A five-year course, leading to the Leaving

Certificate Examination, is provided.

Provision is made for pupils who wish to enter the Teachers' Colleges for training as teachers of agricultural subjects or to enter the University.

In addition to a training in the agricultural sciences, the pupils receive a sound general edu-cation, and special attention is paid to practical training in the field and on the farm. Woolclassing is also taught.

Application for admission to these schools should be lodged immediately

The boarders pay £14 per term for board, lodging and laundry (three terms a year). If in attendance the whole three terms the total charge will be £42. For two or more boys of one family attending one of these schools, the fees per pupil are £33 12s Od per annum. In allotting places for boarders, preference is given to eligible applicants from country districts

The equipment generally is up-to-date, and is designed to show the latest developments in

labour-saving devices

A limited number of free scholarships is available annually at each school. Particulars will be made available on application.

#### **HURLSTONE**

The Hurlstone Agricultural High School is situated at Glenfield, 24 miles from Sydney, in modern buildings amidst spacious fields and playing areas

The School accommodates 215 boarders and about 225 day boys Day boys may obtain free train passes to and from their homes.

### McCAUGHEY MEMORIAL.

The grounds of the McCaughey Memorial Agricultural High School, Yanco, comprise an area of approximately 1,000 acres, and the buildings are surrounded by capacious lawns and gardens. The school accommodates 200 boarders.

#### FARRER MEMORIAL.

At the Farrer Memorial Agricultural High School at Calala, 7½ miles from Tamworth, there is accommodation for boarders.

The site consisting of 252 acres occupies a magnificent position in the beautiful Peel River Valley, and is laid out on the principle of a homestead and mixed farm.

> I. G. McKENZIE. Director of Education.

### PARAGRAPHS AND NOTICES.

### Spraying Protects Vines Against Downy Mildew.

Owing to the dry seasons which have been experienced during the last few years in New South Wales, little or no loss has occurred from downy mildew of the vine. In consequence, there may be a tendency on the part of some vine growers to neglect to spray with Bordeaux mixture as a preventive of this fungous disease. The shortage of labour may also influence certain growers to neglect spraying for the time being, and again the uncertainty of future prospects of the wine industry may have an effect.

With a change to "normal" seasons we can expect downy mildew to make its appearance, and the result of not spraying may prove very detrimental. The operation may be looked upon in the light of an insurance. I have witnessed the effects of downy mildew since the year 1917, when it first made appearance in Rutherglen, Victoria, and my experience of the results in bad years from neglect of spraying would never suggest an easing up in the use of Bordeaux.

Not only does downy mildew affect the pruning wood for the following year, but it can also mean disaster to a coming crop if an early attack is experienced on the young bunches. This disease, if only attacking the foliage, can interfere seriously with the proper ripening of the grapes, which in turn prevents the making of good quality wine. Where vines are badly attacked, the grapes may

only be fit for the making of distillation wine. Table grapes, of course, can be rendered unsuitable for marketing.

In addition to the summer spores, downy mildew produces winter spores. These carry over in the soil until suitable spring or summer conditions develop them, and start a fresh attack of the fungus. Hence it can be seen that although the State has been fairly free from the disease for some considerable time, it can reappear when suitable weather conditions exist.

I cannot forecast what restrictions may be imposed in the future on the wine industry, and growers unfortunately, will have to carry on, unless conditions get too had. However, if the working of a vineyard is worth doing at all, then it is worth doing well. Table grape growers have brighter prospects than wine grape growers, and these men cannot forego the usual spraying programme.

Bluestone may be difficult to procure in some instances, but every endeavour should be made to obtain it before deciding to abandon Bordeaux spraying. Quite a number of growers I have contacted have sufficient stocks on hand to carry them through the season. It is important to use fresh lime; even specially hydrated lime should not be old stock.—H. L. MANUEL, Viticultural Fypert.

### Bunch-facing of Cherries Saves Labour.

Owing to shortage of labour for harvesting and packing of fruit, serious consideration must be given to carrying out these operations with the minimum of handling. Growers' organisations in the main cherry producing districts have passed resolutions requesting the Department to make a regulation prohibiting "row-facing" of cherries, as they contend that much time, labour and expense will be saved in packing the fruit, if "row-facing" is prohibited. Consideration is being given to this request.

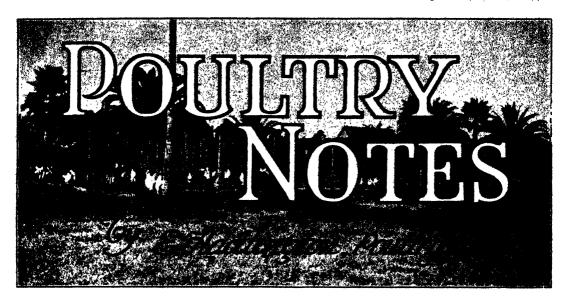
Departmental officers have for some years been opposed to "row-facing" of cherries, as the practice not only slows down packing operations, but, mainly because there is a tendency towards "topping" the fruit, for no matter how conscientious the "facer" may be, one is liable to pick out the largest cherries when individual fruits are selected and rowed in.

"Bunch-facing" of cherries, which will give a satisfactory "face" for display purposes and will save labour in packing, has been demonstrated and recommended by Departmental officers. In addition, this method gives a truer indication of the

fruit in the box. It should be borne in mind that the Act governing the marketing of fruit requires that the shown surface of the fruit shall be a true indication of the whole of the fruit in the package Topping is an offence under the Act, and renders offenders liable to prosecution.

Viewing this question from the labour shortage position, it is estimated that with a little practice a "facer" will be able to "bunch-face" five or six boxes in the same time that is required to "row-face" one box. This means that where a grower has employed eight to ten "facers" in the past, two only will be required, thus making further labour available for picking the fruit or other duties.

In "bunch-facing," instead of selecting single cherries and rowing them in, clumps of several cherries are lifted by the stalks and placed in the box with the stems uppermost. When the first layer of fruit is completed the box is then filled by carefully tipping in the required quantity of fruit.—C. G. Savage, Chief, Division of Horticulture.



### Disposal of Second Year Hens.

MANY poultry farmers, attracted by the exceptionally high prices ruling in the markets for hens, are inquiring about marketing the second-year hens while prices are good. It must be realised, however, that egg prices are also high, and if normal production is obtained between now and February, it would be more profitable to hold hens—light breed hens at any rate—for that period or even longer, than to sell them now. The only circumstances which would justify the disposal of hens at pre-

sent are shortage of labour, lower than average production, and inadequate accommodation.

The estimated monthly production from first- and second-year hens from October to February is as follows:—October, 10 eggs per bird; November, 17; December, 16; January, 13; February, 11. If the second-year hens maintain those levels of production they should show a profit over cost of feed for the five months, of about 10s. per pair, provided that there is a slight



Head of Good Layer



Head of Poor Layer

increase in egg prices after November. Even though light breed hens are now realising 10s. per pair in the markets, the egg production between now and the end of February, plus, say 4s. per pair for the birds at that time, would show a better return.

Thus, as far as light breeds are concerned, the soundest course is to cull only those which are obviously not in laying condition and any which show signs of breaking into a moult.

In the case of heavy breeds, the same procedure should be adopted if the birds continue laying up to the averages mentioned above, but usually among second-year hens of these breeds there are a number which become "coarse," and therefore do not lay sufficient eggs to warrant keeping them until they moult. These birds should

be marketed; they should realise higher prices on account of their size, and it will be more profitable to sell them while the good prices hold.

The advice given regarding both light and heavy breeds is on the assumption that the number of persons employed on the farm would not be reduced even were the old birds sold in one batch. If, however, a reduction in staff could be made by quick disposal, the position would be altered, and an equal or perhaps better return might be obtained by selling.

Another aspect that should not be overlooked is the effect of wholesale marketing of hens early in the season on the supplies of eggs available for export and local requirements, and on the prices received for the hens.

### The Cost of Producing Eggs.

THE cost of producing eggs is a matter which is frequently discussed, and while it is difficult to work out an estimate which would apply to all farms, owing to the wide variation in conditions, size of farm, value, etc., a fairly accurate figure can be arrived at on a one-man farm of, say, five acres, carrying 1,000 layers. With a view to showing present day costs on this basis, a allowing the basic wage to the owner, plus interest on capital invested, the following estimate has been prepared:

The Basis.—5-acre farm.

Labour--one man and part assistance of wife.

Production--12 doz. eggs per hen per annum.

Average prices of principal foodstuffs landed on farm—

***			đ
Wheat, per bushel		3	11
Maize, per bushel		6	6
Pollard and bran, per bushel		ī	4
Wheatmeal, per bushel		ı	7
Ready mixed mashes, per bushel		1	9
The Costs.—			
_	£	s.	d.
Interest on land (5 acres at £60 per			
acre), at 5 per cent	15	O	0
Interest on buildings and plant (£800),			
at 5 per cent	40	0	0
Depreciation on buildings and plant	,		
(£800), at 3 per cent	24	0	0

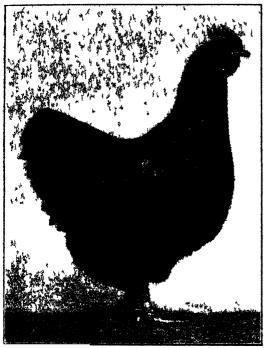
Costs -continued.	Ł	s.	d.
tost of feeding 1,000 layers, at 7s 9d. per head	387	10	o
Feed and fuel to raise 600 pullets to productive age, at 25 Id. each Municipal or Shire rates and water	62	10	0
rates and excess water	25	0	O
Incidental expenses, vaccination, etc.			
Basic wage allowance, £4 145 od. per week	_		
pool deductions, commission, grad- ing deductions, etc.)	150	ņ	0
Cost of producing 12,000 doz. eggs Cost per doz., 1/7.268d	£963	8	0

The cost per dozen of producing eggs on this basis is thus 1/7.268d.

It is to be noted that in this calculation no allowance has been made for dwelling, which might be valued at £400, as it is considered that interest and depreciation should be met out of allowance for wages.

In view of the almost general practice adopted on poultry farms since chicken sexing came into vogue, of purchasing mainly sexed pullets for replacement of stock each year, less revenue is derived from the sale of cockerels, and it is estimated that any return from this source and from the sale of hens at the end of their profit able life, would about cover the purchase of day-old pullets for flock replacements, leaving the cost of rearing these pullets as a charge against the revenue from the farm.

Further reasonable costs might be added, such as maintenance of buildings and plant (which would not be adequately covered by the depreciation shown), and a higher allow-



A Good Layer

on a one-man farm taking into consideration the hours worked and the ability and energy required to make a success of the undertaking

A feature of the estimate which should not be overlooked is the increased cost of replacement of flocks where pullet chicks mainly are purchased, but in cases where the pullets are given the benefit of the extra accommodation resulting from not rearing cockerels some advantage might be gained in raising better birds. This matter is of course bound up with the market for cockerels and facilities for raising them, as well as the labour required but there is no doubt that on many farms in normal times profits could be augmented by producing good market cockerels and on present prices the raising of cockerels should show a handsome profit

### The Returns Necessary to Meet the Costs.

The figures show that an average price for the year of at least 15 8d wholesale,

for first grade eggs, would be necessary to give the producer the basic wage and allow for reasonable interest and depreciation on plant and buildings, as allowance has to be made for the under grade eggs. To average 1s 8d per doz wholesale, the following monthly prices would require to be maintained during the next twelve months—October, 1s 6d, November, 1s 7d, December, 1s 8d, January, 1s 9d, February, 1s 9d, March, 2s, April, 2s, May, 2s, June, 2s, July 1s, 9d, August, 1s, 6d, September, 1s, 6d

These calculations are based on present costs including those of foodstuffs and any alteration would affect the prices

### Mexican Poppy Seed in Wheat.

CASES have recently come under notice in which a heavy drop in egg production fol lowed by some mortality has occurred as a result of feeding either soaked or ground wheat which contained Mexican poppy seed

On one farm an egg yield of 700 per day was reduced to 200 per day within a week the lowered production commencing a few days after the poppy infested wheat

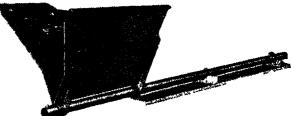


A Poor Layer.

# Solve the Blowfly Problem

the scientific way!

Here is the new scientific process of fighting the most harassing and expensive pest known to the industry. It reduces to a minimum the necessity of continually waging a ceaseless war against this great menace.



# M.V. CRADLE (PATENTED) FOR MULES OPERATION

The low cost of the equipment, combined with the saving of labour, time, and money, to say nothing of the greatly reduced mortality rate, make the MULES OPERATION an outstanding contribution to the industry, in fact the M.V. (Patented) CRADLE is a first class investment. PREVENTION IS BETTER THAN CURE.

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RICHMOND, N.S.W.,

offers lads of 16 years of age or over the opportunity of acquiring a thorough theoretical and practical knowledge of every branch of farming

Area, 3,500 acres, 1,100 acres cultivated.

All types of Agriculture and Animal Husbandry taught to neet the diversified conditions of the various parts of the State

Comprehensive machinery and equipment including tractors

Suitable training for farm requirements in carpentry, blacksmithing and saddlery Extensive studs—Jersey cattle, pigs, sheep

Dairy Factory Orchard, Poultry Farm, Apiary

Brick buildings, separate bedrooms, electric light sewerage unlimited water supply

Doctor in attendance

### COURSE AVAILABLE.

Agriculture D ploma Course (HDA), of three years duration, embracing instruction in General Agriculture and Live Stock

This course gives a well balanced combit tion of Classroom Tuition and Field

Practice

Entrance requirements-Intermediate Certificate or an equivalent

### TWO SESSIONS PER YEAR.

First session commences early in February each year

FEES \$16 10 0 per session, covering board and lodging, tuition, medical,

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A liberal number of scholarships and bursaries is available

The Principal or The Under Secretary and Director,
Hawkesbury Agricultural College
Richmond

Hawkesbury Agricultural College
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Richmond

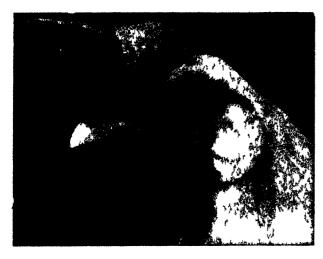
Hawkesbury Agricultural College
Richmond

Hawkesbury Agricultural College
Richmond

was ground into a meal and given in the morning mash. In this case poppy seed at the rate of 18 oz to the bushel was found to be present in some bags of wheat. About a week after the wheat containing poppy seed had been given, a large number of birds showed signs of listlessness, yet their combs and wattles remained fresh; many, however, were affected with a swelling at

a time when production should have shown a marked increase Laying was not restored to normal for another two weeks

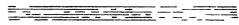
When the birds reached the lowest point in production about 50 per cent of them were showing a darkening of the combs and obvious loss of tone, yet there were only odd cases with any swelling of comb or wattles. A noticeable feature was the

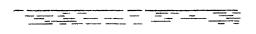




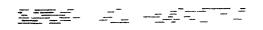
The Head of a Good Layer

This photograph is typical of a bird in full lav





The Head of a Poor Layer
Showing dull appearance and shrivelling of the comb





the base of the comb Later some developed diarrhoea and eventually died

In a more recent instance, wheat containing Mexican poppy seed was soaked and fed to the birds both morning and night. The amount of seed found in this case was about ½ to 2 lb per bag. No noticeable loss of production occurred for about ten days after commencing to feed the wheat, but the daily totals gradually fell during the next thirteen days, from 550 to 324, at

greatly increased thirst of the birds which was manifest as production commenced to fall

The wheat containing the poppy seed was given to the birds for just on two weeks before the seed was noticed after which it was screened out. Thus the effect was apparent for a period of at least a month after its exclusion from the ration.

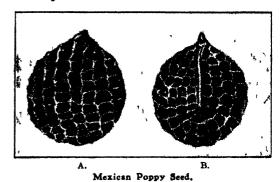
These are typical instances of the heavy financial loss which can be caused by this

seed, and poultry farmers should closely examine their wheat, particularly if it is intended to soak it or grind it into meal. The seed is dark in colour and similar in size to rape seed, but with a pitted surface; it might not be observed unless a close inspection is made of the wheat.

Not much risk is incurred in feeding the poppy seed infested wheat dry, especially if scattered on the ground, as under such conditions the birds do not usually eat the seed.

Results of feeding tests with Mexican poppy seed, carried out at the Veterinary Research Station, Glenfield, by Mr. L. Hart, B.V.Sc., H.D.A., were published in the Australian Veterinary Journal, April, 1941.

These tests showed the toxic effect of the seed upon fowls.



(Enlarged.)

A.—Top view.

B.—Bottom view.

The seed is about one-fifteenth inch in diameter, and is distinctly pitted when looked at through a magnifying glass.

### Feed and Feeding Notes.

(Continued from page 457.)

these may be approximately gauged by taking into account the feeds from which they are stated to be prepared, and the analysis on the containers as is required by the New South Wales Stock Foods and Medicines Act.

The starch and protein equivalent values are given in case the prices quoted are greatly different from those in operation at the time at a particular centre. They may be used to work out food unit costs as described above.

The prices quoted are the average Sydney prices and are of most value for the prepared feeds, as grain by-products, oil meals, meat meals, etc., many of which are largely manufactured in Sydney. The roughage prices will be of least value as the price level will vary widely throughout the State.

The most valuable comparisons are those made within a group of feeds, i.e., between roughages, between starch concentrates and between protein concentrates.

Only the common feeds are listed; those only in sporadic or negligible supply have been omitted.

#### Factors Other than Price Must be Considered.

Price considerations do not take into account several important factors involved in feeding, namely, palatability, texture of ration and the variability of feeds, and if

food unit costs are to be of maximum value these aspects must be considered.

The more important are as follows:—

- 1. Oats and bran, even though they may be a little dearer on a food unit basis than the other grains, may still be worth buying on account of their leavening properties when mixed in a feed, i.e., their capacity to improve the texture of a ration, especially for dairy cows.
- 2. The chaffs and hays, especially lucerne, will vary widely in food value according to stage of growth when cut, efficiency of curing, percentage of leaf or grain, extent of foreign material as weeds, and other factors. A range of food values is given for lucerne chaff (35 to 45) to cover this variability and the purchaser should use his discretion as to which figure to use. Average quality lucerne hay should be given a value of about 40.
- 3. Cost of preparing the feeds where necessary, i.e., crushing or cracking, must also be taken into account and added to the cost when comparing grains with grain meals, etc. This is usually estimated at 2d. to 3d. per bushel for cereal grains. Also, where freight costs are considerable or vary between different feeds on account of different haulage distances, they must be added to the cost before determining the cost of starch or protein units.

### Infectious Catarrh of Poultry.

T. G. HUNGERFORD, B.V.Sc., H.D.A.

INFECTIOUS catarrh is a disease of poultry which closely resembles the chronic form and also the milder types of the acute form, of laryngo-tracheitis. Together with laryngo-tracheitis and such conditions as fowl pox, green feed deficiency and coryza, it is often referred to as "roup".

Though this disease has probably been present in New South Wales since the beginning of the poultry industry, its separate entity was not established until careful

investigations were made into laryngo-tracheitis outbreaks.

Investigation into the exact cause of outbreaks of infectious catarrh has been extremely limited in New South Wales, and it may be that this disease entity will be shown, in the future, to be a group of several closely allied diseases, the relationship of which is not, at present, certain, but which may have some connection with the group known as coryza.

When odd cases (e.g., not more than 5 per cent. of the pullets) develop the symptoms commonly referred to as canker, or as eye, diphtheric and catarrhal roup, it is probable that infectious catarrh is the exciting cause. The same may be said when practically the whole pullet flock is affected with a mild catarrhal disease, marked by coughing, eye, and nose discharges, the development of "canker" in some cases, but which causes very few deaths.

#### The Cause.

The actual cause of the disease is uncertain, but it would appear to be a virus Information as to the cause and identity of the disease has been accumulated from such instances as the following.

In 1935, twenty-four outbreaks occurred of a catarrhal disease that simulated mild laryngo-tracheitis, and in each of these outbreaks it was impossible to transmit the condition by injecting infectious material from affected birds into the windpipe of birds susceptible to laryngo-tracheitis. In one outbreak a severe mortality (over 20 per cent.) occurred with infectious catarrh. It was impossible to transmit this disease by taking the nasal and tracheal discharges and placing them in the trachea of experimental birds—laryngo-tracheitis transmission readily takes place by this means. In a number of outbreaks, birds recovered

from symptoms of infectious catarrh, have been infected with laryngo-tracheitis, showing that they could not have been previously affected with the latter. In a number of cases in the field, birds which have recovered from an outbreak of laryngo-tracheitis have been later affected with a clinical outbreak of infectious catarrh. Frequently it has been found that this condition can be transmitted by intra-nasal instillation into susceptible birds, but that after several passages the disease tends to die out, and cannot be kept going by any means of transmission from bird to bird.

Thus, the evidence points to the presence of a separate cause for this disease which so closely resembles a mild attack of

lary ngo-tracheitis.

Predisposing causes are heavy infestation with round worms, overcrowding, faulty ventilation, and deficiency of green feed or some alternate source of vitamin A in the diet, all of which lower the resistance of birds to infection with this disease. In fact, infectious catarrh is one disease in which the predisposing factors play a more important role than the presence or absence of actual infection.

#### Infectivity.

The mode of infection would appear to be by direct contact, e.g., affected birds coughing over their neighbours on the perches at night, or by means of feed and water trough transmission. Fowls appear to be susceptible at any age, but outbreaks are perhaps most common when birds are from three months to one year old.

In some cases one outbreak appears to confer an immunity for the rest of life, as in the case of laryngo-tracheitis, but in other cases birds seem to suffer from recurrent attacks, as is the case in coryza.

#### Symptoms.

The course of the disease is a fairly protracted one, and varies from about three weeks to two months.

In some outbreaks, particularly in the case of pullets, the disease may affect the flock as an epidemic in which nearly all birds show symptoms. They have a mucoid discharge from the eyes and nose, they cough and may make gurgling noises. The discharge thickens to form cheesy deposits in the eye, mouth, nasal and throat cavities, and in the latter may cause suffocation.

Where odd birds only in the flock are affected, they may not be noticed until these cheesy, or so-called "canker" deposits occur.

### Post-mortem Appearances.

For post-mortem examination the nasal cavity, mouth, throat, and windpipe should be slit open carefully. Excess mucus and or tough cheesy deposits will be present in the mouth, nose and throat. The lining membranes may be reddened.

The windpipe is sometimes a little inflamed, but lacks the violent inflammation so characteristic of laryngo-tracheitis. No marked changes are present in other parts of the body.

### Differential Diagnosis.

In an outbreak of disease which resembles both mild laryngo-tracheitis and infectious catarrh, differential diagnosis depends on laboratory infection tests. It should be particularly noted that, on clinical grounds, the disease is clearly marked off from the peracute form of laryngo-tracheitis, because the birds do not cough out blood or bloodstained mucus. Similarly, infectious catarrh may be differentiated from coryza, in that cheesy membranes (often referred to as "canker" or "diphtheritic roup") occur in the former, but not in the latter. Because differential diagnosis is often so difficult, veterinary advice should be sought.

#### The Losses Caused.

The mortality rate is not usually heavy, although it may be serious when the disease follows an outbreak of green feed deficiency

disease. In one such case more than 20 per cent. of the affected birds died; this was in addition to the losses, some weeks previously, due to green feed deficiency disease. Usually losses vary from 1 to 5 per cent. as compared with losses varying from 5 to 35 per cent. in cases of laryngo-tracheitis. The main loss from the disease is the diminution in egg production, which is fairly marked in most cases.

#### Control.

Up to date no satisfactory means of vaccination or other technical control has been worked out, and control measures should, therefore, be directed towards the elimination of all predisposing factors of disease, particularly by providing ample ventilation and green feed and the elimination of worm infestation. It is important also to supply ample, high-quality shell grit or other source of lime in the diet.

Home remedies are used perhaps to a greater extent in the treatment of infectious catarrh than with any other poultry disease. Common remedies resorted to are:—

Syringing out the nose with a solution of salt and borax.

Smearing preparations such as eucalyptus, menthol solutions, kerosene and various inhalant preparations around the nostrils.

Placing bluestone in the drinking water.

Placing disinfectants such as chlorize and potassium permanganate in the drinking water.

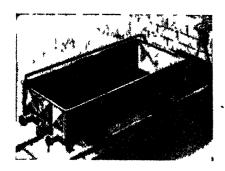
To date there is no evidence that any of these medicaments is of marked value in controlling the severity of or limiting the mortality from the disease. On the other hand, many of the medicaments used may be definitely harmful.

One exception is the treatment given birds choking and crying out, due to obstruction of the windpipe with cankerous material. The removal of this with the quill of a feather, followed by painting with a solution of I oz. of copper sulphate to I pint of water will save odd birds which would otherwise suffocate.

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Every such act slows down the war effort, so-

### DON'T DELAY TRUCKS.

It is foolish, wasteful, dangerous, unpatriotic.

S R. NICHOLAS, Acting Secretary for Railways.

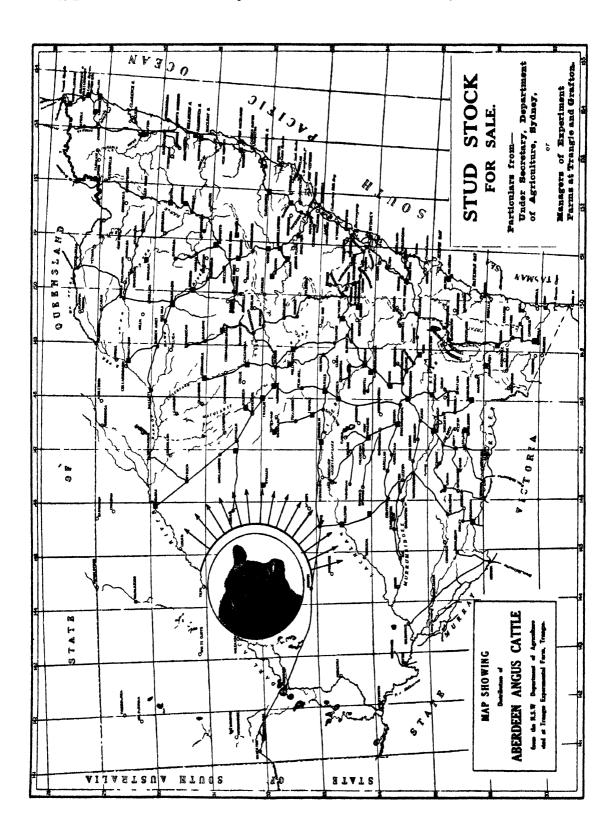


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"Keeps on Keeping on."



### Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.		Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
Consideration of the Considera		1942.			1943.
. and C. Ryall, 5 Western Avenue, West			S. E. E. Cohen, Auburn Vale Road, Invereil	23	12 May
Wollongong	57	z Oct.	B. N. Coote, Auburn Vale Road, Inverell	43	14 ,,
eel River Land and Mineral Co., Tamworth		_	J. De Ville, Inverell	10	ΣŚ ,,
(Beef Shorthorns)	16	8	Cowra Experiment Farm	41	27 June
. I. Toohev, "Mandemar," Berrima .	56	8 "	P. M. Burtenshaw, Killean, Inverell	31	27 ,,
V. J. Stephenson, "Hill View," Fig Tree	23	10 ,,	A. E. Liggins, "St. Leger Dairy," Kuring-gai Chase Road, Turramurra North		
V. C. Wyatt, Sherwood Road, Merrylands	29	12 ,,	Chase Road, I urramiirra North	52	7 July.
lawkesbury Agricultural College, Richmond		-0	Farm Home for Boys, Mittagong	49	_9 "
(Jerseys) L. Killen, "Pine Park," Mumbil	128	18 "	Kahlua Pastoral Co., "Kahlua," Coolac	314	10 ,,
	201	20 ,,	Lunacy Department, Rydalmere Mental	65	
. Brownlaw, Gol Gol Iuristone Agricultural High School, Glen-	34	26 ,,	W. J. Frizelle, Rosenstein Dairy, Inverell	76	30 ,, I Aug.
field	امما	26	W. Budden, "Hunter View," Kayuga Road.	70	I Mug.
I. Fairbairn, Woomargama	33 210		Muswellbrook	18	
egenhoe Estates, Scone	65		T W.Y 117-112 Y	33	5 ,,
unacy Department, Gladesville Mental		31 "	W. Willis, "Rosedale," Invereil	17	13 ,,
Hospital	22	14 Nov.	A. Hannaford, Braidwood	20	26 ,,
athurst Experiment Farm (Ayrshires)	21	18 ,,	W S. Grant, Braidwood	20	26 ,,
/. W. Martin, "Narooma," Urana Road,		,,	J. McKenzie, Inverell	35	28 ,,
Wagga	150	29 .,	Farrer Memorial Agricultural High School,	33	"
. G. Wilson, Exeter (Jerseys)	68	29 ,,	Nemingha	39	29 ,,
(31101) a		-, "	The William Thompson Masonic School,	"	-, ,,
cGarvie Smith Animal Health Farm, Liver-		1943.	Baulkham Hills	50	29 ,,
pool	65	ı Feb.	Navua Ltd., Grose Wold, via Richmond		
inacy Department, Parramatta Mental	_		(lersevs)	113	4 Sept
Hospital	31	6 ,,	Australian Missionary College, Cooranbong	113	8 ,,
he Sydney Church of England Grammar			Department of Education, Gostord Farm	_	
School, Moss Vale	55	6 ,,	Home	40	29 ,,
udor House School, Moss Vale	17	6 ,,	Barnardo Farm School, Mowbray Park	75	4 Oct.
oyong School, Moss Vale	2	6 ,,	A. I., Logue, "Thornbro," Muswellbrook	46	13 _,,
ew England Girls' Grammar School, Armidale		6 ,,	Wollongbar Experiment Farm	112	4 Dec.
. E. Stace, Taylor Street, Armidale	31	7 .,,	State Penitentiary, Long Bay	10	9 "
ew England University College, Armidale	13	1 Mar	Town & Day Mariant		1944.
Boland, "Seaton," Inverell	9	1 ,,	Limond Bros., Morisset	60	13 Jan.
arker Bros., Hampton ('ourt Dairy, Inverell		ĭ ,,	C. Wilton, Bligh Street, Muswellbrook	75	3 Feb.
D. Frater, King's Plain Road, Inverell	104	I ,,	Department of Education, Yanco Agricultural High School	60	6
C. O'Dea, Perry Street, Dundas	138	-1 '	Riverina Welfare Farm, Yanco		" ءَ ا
mu Plains Prison Farm	100		N. L. Forster, Abington, Armidale (Aberdeen	74	۰,
unacy Department, Morisset Mental Hospital		20 ,, 25 ,,	Angus)	188	12
erry Training Farm, Berry	114	2 April.	Forster and Sons, Abington Armidale (Jerseys)		12 ,,
. C. Dixon, Elwatan, Castle Hill (Jerseys)		3 ,,	Wagga Experiment Farm (Jerseys)	8r	20 ,,
. Michael's Orphanage, Baulkham Hills	18	5 ,,	St. Ignatius College, Riverview	25	27 ,,
iverpool State Hospital and Home	102	10 ,,	Lunacy Department, Callan Park Mental		-, ,,
C. Harcombe, Hillcrest Farm, Warialda		,,	Hospital	26	1 May
Road, Inverell	32	15 ,,	T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 June
. N. De Fraine, Reserve ir Hill, Inverell	22	15 ,,	New England Experiment Farm, Glen Innes		
rafton Experiment Farm	190	17 ,,	(lersevs)	73	27 ,,
. W. D. Humphries, "Karoola," Muswell-		• "	G. T. Reid, "Narrengullen," Yass	178	3 Jüly
brook	162	24 ,,	St. Vincent's Boys' Home, Westmead		20 ,,
. F. White, Bald Blair, Guyra (Aberdeen		' "	Lidcombe State Hospital and Home	106	30 ,,
Angus)	137	26 ,,	N. East, Gum Flat Road, Inverell	61	13 Aug
ir F. H. Stewart, Dundas	6	30 ,,	Ehsman Bros., Inverell	28	13 ,,

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area.

Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry.

### Apiary Notes.

(Continued from page 474.)

The bee-keeper who purchases small lots of bees here and there, and who is careless enough to place them in his apiary without first making a thorough inspection of the hives, is surely looking for trouble. The

same may be said of the bee-keeper who uses second-hand material from an outside source without first having it thoroughly sterilised by immersion for a full half hour in boiling water.

### Brucellosis-free Herd Scheme (Swine).

#### LIST OF ACCREDITED HERDS.

The following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

#### Registered Stud Herds.

Adams, J. P., "Melton," Daysdale.
Allard, S. R., Cleobury Stud, Weromble Road, via Camden.
Bathurst Experiment Farm, Bathurst.
Campbell, D., Hillangrove, "Wamberal," via Gosford.
Chapman, G. E. and Son, "Illabo Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Croft, F., Lugwardine, Kentucky.
Draper, R. E., "Gengar," Capertee.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Grafton Experiment Farm, Grafton.
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College, Richmond.
Holland, A. L., Argonne, Tubbul.

Hurlstone Agricultural High School, Glenfield,
Maybin, N. C., Towac, Orange.
McCaughey Memorial Agricultural High School, Yanco.
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F., "Camelot," Penrith.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud," Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell.
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollongbar.

#### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Afforestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Salisbury Court," Uralia.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.

Morisset Mental Hospital, Morisset.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V., Marata, Harrow Road, Glenfield.
Smith, C. W. J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorium, Waterfall.

### Abortion-free Herds.

The following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Owner and Address.	Number in herd.		Number in herd.
Bathurst Experiment Farm (Ayrshires)  Bauerle, P. A. Holbrook  Bush, W., Ben Lemond  Carrick, G., "Clonlea," Central Tilba  Cowra Experiment Farm (Ayrshires)  Curtis, A., Meryla, Morven  Department of Education—Farm Home for Boys  Gorford  Department of Education—Farm Home for Boys  Mittagong  Dixson, R. C., "Elwatan," Castle Hill  East, N., Gum Flat Road, Invereil  East, N., Gum Flat Road, Invereil  Edwards, G. M., "Rothwick," Uralia (Jerseys)  Fairbridge Farm School, Molong  Farrer Memorial Agricultural High School, Nemingha  Forster, N. L., Abington, Armidale (Jerseys)  Forster, N. L., Abington, Armidale (Jerseys)  Hidls A. A., Estate, Culcairn  Hill, E. Pritchard, Bowling Alley Pt. (Jerseys)  Hordern, E. D., Cabramatta (A.I.S.)  Hurlstone Agricultural High School, Glenfield  Killen, E. L., "Pine Park," Mumbil  Leitch, J. F., "Tunbridge," Merriwa (Aberdeen-Angus)	9 18 37 71 35 40 38 24 43 43 75 265 188 100 95 39 202	McEachern, H., Tarcutta (Red Poll) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital Navua Ltd., Grose Wold, via Richmond (Jerseys) New England Experiment Farm, Glen Innes (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., { (Beef Shorthorns) Tamworth. Reid, G. T., "Narrangullen," Yass Robettson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud," Spurway- street, Dundas Trangie Experiment Farm, Trangie Wagga Experiment Farm, Bomen, N.S.W. Walker, Jas. R., "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen- Angus) Williams, Chas., Ben Lomond Young, A. H., "Rock Lynn," Cudal (Polled Beef Short- horns)	9 88 81 32 137

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The Agricultural Gazette.

November, 1942.

# The V.L.A. (Volunteer Land Army.)

LESS and less perturbation is being caused by the repeated combing-out of the remaining civilian population for more and more men and women for the fighting forces, essential secondary industries and for the civil construction corps. General recognition of the stark necessity of these call-ups is a healthy sign, but an even more encouraging sign is the evidence of a growing desire on the part of civilians to do a more positive wartime job than is at present demanded of them.

Enthusiasm must not be allowed to run riot, for there will always be some purely civilian jobs. At the same time this mounting impatience—perhaps better described as

anxiety to assist directly in the war effort—can be turned to very good account by encouraging civilian groups to take the initiative. An outstanding example in this connection is the volunteer land army idea which is quickly gathering impetus. The V L A. is destined to become a powerful new arm of the wartime national services.

In several country centres town groups of men, women, boys and girls are being organised—some groups are already operating—to supply week-end or holiday labour on local farms. Town business people are co-operating enthusiastically by agreeing to close their shops and offices for one or two days each week to free their employees for this volunteer army of landworkers.

The scheme is worthy of widespread adoption and will receive every encouragement from local and central War Agricultural Committees. It will solve to a very large extent the manpower shortage in some of our essential primary industries, thus contributing very positively and vitally to that fund of endeavour which will ensure an Allied victory.

THE story of the organisation of the Guyra district, by the farmers themselves through their Agricultural Bureau branch, to make maximum use of available labour for essential primary production, is told on page 492 of this issue.

It describes an important contribution to the war effort that is worth emulation

elsewhere.

### GUYRA AGRICULTURAL BUREAU'S ORGANISED FARMING EFFORT—

### Planned Agriculture.

### Guyra District's Outstanding Example.

CERTAINLY the most outstanding example in this State of comprehensive and detailed agricultural planning is to be found in the Guyra district. Months before District War Agricultural Committees were even mooted, the Guyra Agricultural Bureau foresaw and planned to meet the very difficulties which eventually influenced the formation of War Agricultural Committees.

In other words, there has already been set up in the Guyra district the ideal in farm planning which it is hoped to achieve in every agricultural district in the Commonwealth. When that is done the nation will have little to fear on the food front, as many of the most pressing wartime problems confronting primary producers can be (in fact, will have to be) solved by organised farmer-effort.

Profiting by the experience of the previous season, when enlistments, call-ups and the flow of agricultural labour to the better-paid secondary industries had depleted the district's manpower, the Guyra Agricultural Bureau called a meeting of all farming interests in the district. At that meeting, held in the early months of this year, a central committee was appointed and its services offered to the Manpower Directorate to assist and advise on any problems affecting the farming community.

#### District Zones and Statistical Survey.

Subsequently the Guyra district was divided into nine zones, with an organising secretary in each. These secretaries were added to the original committee to form a central executive and co ordinating body. The boundaries of each zone were clearly defined, and the first job of each zone secretary was to make a statistical survey of his area. To assist in this work (mostly done by personal canvass) the farmers elected manageable zonal committees.

The statistical surveys were collected on an agreed uniform basis, making it possible for the central committee to combine them in one complete "picture" of the district's farming activities. These surveys also allow of analysis of the requirements of any particular industry either in a zone or in the whole district. The survey shows, in regard to each farmer, the area of arable land, the area under crop (or proposed to be put under crop) to Navy beans, maize, potatoes, peas, oats, etc. In addition, it shows the number of farm hands employed at present, the estimated additional number required for the various crops or farm operations, and the specific periods for which this labour is required. Numbers and types of machines, lorries and horse teams on every farm are also shown.

#### To Ensure General Acceptance.

It became evident to the Guyra Bureau very early that the solution of the district's problem would depend on the willingness of the farmers to pool all their resources of labour, machines and horse teams, and to work their farms collectively. To get general acceptance of such a more or less revolutionary scheme has involved considerable Meetings of farmers have been called and the proposition explained and discussed, until eventually the scheme has been adopted, not as the plan of an individual leader or group, but as the whole community's solution of an otherwise unsolvable problem. Confidence is now expressed that Guyra farmers will carry out, this season, Australia's most successful attempt at collective farming.

### How Priorities Will be Decided.

It has been agreed that all labour will be pooled and, under the direction of zonal committees, will be transferred from farnt to farm as required. Where the condition of the crops indicates clearly the order of harvesting, that order will be followed. Ownership, boundary fences, and the preferences of individuals will not be allowed to influence decisions. The management committees will aim to carry out every operation at the most opportune time and in the most effective manner. Where choice is difficult and there is nothing to be gained by working according to some pic arranged plan, the order will be decided upon by ballot.

### Maximum Use of Machines.

The maximum use of machines and the minimum use of hand labour is the general aim. No potato crop for example, will be

usually follows a comparatively narrow path and is just as likely to take the first, second or any crop as the last. In any case, as the Guyia Bureau committee points out, when the crops in any locality are ready to be harvested, pooled labour and machines will be so concentrated on the one area that the total crop will be taken off this year in as many days, perhaps, as it previously took weeks. This should lessen the risk for all crops

### Labour on Exchange Basis.

So far as possible payment for pooled labour will be balanced out on an exchange basis the balance in any farmer's favour being paid for at 2s an hour. When working away from their own or their employers' farms, members of the labour pool must make their own arrangements for transport and must provide their own food. Catering



dug which can be lifted by machine. In fact the only potatoes it is aimed to fork out are those growing on stony ground. These will be lifted by pooled labour and rates have been tentatively fixed at 2s per bag for 4ton crops and over and 2s bd per bag for lighter crops.

### Collectivism Minimises Crop Damage.

A spurious argument sometimes used to discourage collective harvesting is that the last man's crop runs all the risk of hail or storm damage. This risk, relatively small even in the worst districts, can never be timed with the nicety that "last crop" arguers would have you believe, the storm

rot a latge group of visiting labour, which might be on a faim for only one or two days and might fluctuate in numbers while it is on that faim, would prove difficult and costly for the owner of the visited farm. In most cases he would have to employ labour to assist with the catering, and that has to be avoided

#### Make Best Use of Skilled Labour.

Skilled labour will be used to greatest advantage all the time. If, for example, a man is a good stack-builder, that will be his till time job. The less expert work on that man's tarm will, this season be undertaken by unskilled members of the labour pool.

while he (an expert stack builder) will go from farm to farm helping to construct, or directing the construction of, what is all too infrequently seen on New South Wales farms—well built and well thatched stacks.

As with men so it will be with machines; every machine, or lorry, or horse team to its most appropriate job. The large machine for the large crop, and the small machine for the crop most fitting to its capacity. Under this arrangement it can be visualised that farmer A might be called upon to use his machine in farmer B's crop, while farmer B is using his larger machine in A's more extensive crop.

In connection with pooled machines, lorries and horse teams, the right is reserved to the owner to accompany and operate his machine or drive his own team when employed off his property. This arrangement not only safeguards against damage, but is in the interest of efficiency, as the man who knows his machine or horses is the one to get the most out of them.

### Special Bean Growers' Committee.

The Guyra Bureau has organised a special Bean Growers' Committee to handle the Navy bean crop. This committee has been given (free) the use of a receiving shed handy to the rail. After delivery the beans are cleaned and graded, a nominal charge being made to cover cost of labour and other incidentals. No profit is aimed at.

The bean growing operations in this district supply another interesting example of the co-operative use of machines, and also demonstrate how, contrary to generally accepted ideas, the small man has most to gain from pooling and collective farming. In the Guyra district, two of the larger holders have bean threshers which they have agreed to pool. One is a large machine and the other a smaller type These will be used on appropriate areas and will be employed to capacity during the bean harvest. Improvised grain harvesting machines have been used in previous seasons, and, apart from loss due to cracked and damaged grain, the rate charged (7s. 6d. per bag) was about three times what it has been estimated the job can be done for with the bean threshers this season, and with a minimum of damage to the grain.

#### Town Labour and Juveniles.

No problem, or likely problem, seems to have been overlooked in the Guyra Agricultural Bureau's scheme. It is anticipated that some additional labour will have to be brought into the district during peak harvesting periods. The Bureau is looking to Guyra townspeople to fall in with the idea (which originated in that centre several months back) of closing business houses on one or two days a week to supply a pool of labour for local farm work. A good deal of the work in the Guyra district can be done by juvenile labour, and in this regard consideration is being given to the employment, in season, of schoolboy groups, and perhaps members of the Women's Land Army.

Steps have also been taken to guard against a practice of past seasons which operated against orderliness and efficiency; namely, the "bidding" for labour on the part of the farmers. So far as possible, rates for various types of work will be fixed and agreed upon by all farmers in the district. No farm labourer will be free to sell his labour to the highest bidder.

### Ready for Production Goals.

When the production goals or targets are made known the Guyra district will be in an excellent position to say immediately what must be done to bring its production programme into line with the nation's war-It has already time food requirements. given thought to the relative importance of different crops, quite apart from the financial aspect, and is confident of being able to influence a swing from non-essential to essential primary products, if such is indicated by the national production targets. Consideration, for instance, has already been given to the hazards of transporting the pea crop. In normal times fast lorries took the peas by road to Sydney and Bris-Rail transport is not only uncertain this season, but comparatively slow. view of these circumstances, if the production targets set a low priority for this crop, no difficulty is anticipated in changing over to more essential crops.

With such complete organisation to achieve the ultimate in district production, no farmer can afford to stand out of the scheme. On the food front, as on the fighting front, individual action can be a decided hindrance. The nation must fight and work as a unit.

### MINIMISE DROUGHT LOSSES.

### Conservation of Water.

### The Sinking of Tanks and Dams.

ON properties which have no permanent natural water supply, and where bore or well water is not available, tanks and dams must be relied upon. Not only should these be of adequate storage capacity, but they must be maintained in good condition if they are to provide sufficient water for normal requirements and also to tide over the oft-recurring droughty periods.

In areas of the State where the annual rainfall is not less than 17 inches a drought reserve tank of 5,000 cubic yards capacity should be provided in addition to the storage for normal needs. In districts where the rainfall is less than 17 inches the drought

storage should be increased accordingly.

Silting-up of tanks sometimes reduces effective storage by 50 per cent. and more. Too often this is not realised until a droughty season is experienced. Overhaul of tanks and dams should, therefore, be undertaken annually. Where de-silting is not possible, additional storage should be provided. It is also important that drains leading to tanks should be kept in satisfactory condition.

In estimating the probable requirements of a property, allowance must be made for evaporation. From a water surface at ground level evaporation in western districts is equal at times to as much as 80 inches a year. The loss from a tank would not be quite as great, for some protection is afforded by its banks. It has been estimated, however, that evaporation in a year will reduce the depth of water in a tank by 5 to 6 feet. This means that the larger the surface the greater the amount of water lost. In constructing a tank to hold a certain storage it is, therefore, best to make it as deep as possible, and in this way reduce the surface area. The best tanks in western districts are from 14 to 15 feet deep.

#### Water Requirements of Stock.

It is somewhat difficult to arrive at the quantity of water that will be required for sheep or cattle over a period of, say, twelve months. Every person must be his own judge as to whether the climatic conditions warrant his providing for a shorter period, or whether in the driest parts it will not be wiser even to provide for a longer period, but there are a few points that are worthy of consideration in determining the size of a dam.

Sheep, more especially when there is plenty of green feed with a moderate temperature, require very little water; indeed, they have been known to go months with practically no water. When, however, feed is dry and dusty they drink a great deal. In hot, droughty weather sheep almost live on water, and they also carry a lot of water in their wool. Taking these things into consideration, and also the evaporation from the surface, it is considered that 11/4 gallons per day for each sheep should be provided. This makes the requirements of each sheep for one year

4561/4 gallons. Each cubic yard of water contains 1683/4 gallons, which works out at about 23/4 cubic yards per sheep; as it is always safer to provide a little more it is recommended that 3 cubic yards of water be provided for each sheep intended to be watered at the tank, or tanks. For 100 sheep, therefore, provide 300 cubic yards of water per year; for cattle and horses provide from 24 to 30 cubic yards for each beast per year.

### Selecting a Good Tank Site.

Very careful consideration should be given to the selection of a site for a tank. The most important point is a good catchment, and this, on some holdings, is almost the sole determining factor. In undulating country catchments are generally good, and no difficulty is experienced, but in the flat country of the western plains levels should be taken. Tanks have been made where water would not flow into them and land often appears level when it has a fall of several inches. Very often shallow watercourses exist, and the tank should be located on or near these. Roads provide satisfactory catchments, and a good flow of water can be obtained off the hard bare patches which exist on the plains.

In selecting catchments attention should also be given to the nature of the country; for instance, a drain running over hard compact soil will carry more water into the tank than one running over black soil, which develops large cracks during drought periods, and which absorbs a large amount of water before any reaches the tank.

The catchment must have sufficient area to catch enough water to fill the excavation in good heavy rains; a large area with a gentle grade is preferable to too steep a catchment, for with

the latter serious scouring is likely to occur, with increased silting of the tank itself during heavy rains.

#### Guard Against Pollution.

Tanks or dams may be placed so as to water more than one paddock if required. If the paddocks are large, however, it is better to place the excavations as near the centre as possible, in order that stock may not have to travel too far to water, and will not tread down the grass so much going to and fro. See that the area is kept clean and does not contain pigsties, sheep-yards, etc. Shade-trees should not be left in the catchment, but rather below it, so that the excreta from stock camping under them may not be washed into the tank and pollute the water. Stock come to water in the morning and like to linger round in the shade, taking frequent drinks before moving off in the afternoon. If shade is not available they probably take only one drink in the day, and consequently do not do as well as they otherwise would.

#### Sink Trial Shafts.

After locating what is apparently a good site. the nature of the soil should be ascertained. On some country a tank will hold well almost anywhere, but in other classes of soil some considerable difficulty is experienced, and recourse must be made in some cases to puddling. The nature of the timber is usually indicative of the character of the subsoil, but is not always reliable. Occasionally the country is patchy; while the subsoil in portion of the tank is good, a band of a porous character may be struck, which will cause a leakage. Before sinking is commenced trial shafts should be sunk to the depth it is proposed to excavate the tank, and if it is considered the country is patchy two or three should be put down. An experienced man can tell by the nature of the subsoil whether or not it will be "good holding," but if there is any doubt a test should be made by partly filling the shaft with water, so that its holding capacity can be ascertained.

### Shape of Tank.

If there is much of a fall in the land the tanks should be made long and narrow across the fall. If the length were made parallel with the fall the water would reach the surface at the lower end while it was still very low at the upper end, and consequently much of the storage capacity would be lost.

Where the site is level a square tank is the most suitable. The desirability of sinking tanks of adequate capacity and of good depth is again stressed. Too often one sees tanks which could best be described as "pot holes". They might serve all right as suitable watering places, but only provided adequate rains are consistently received. During dry spells they rapidly dry out and become useless. A 2,000-yard tank should be the minimum excavation except in very rare cases.

Very steep sides are soon trodden down, mud and clay falls in, and the shape of the excavation is spoiled. This applies to tanks that are not fenced-in and to which stock are allowed access all round. Sheep only should be watered at these, and the slopes should not be less than 3 to 1. If made with bullocks, ploughs, and earth-scoops, they can be taken out at this grade all round, but 3 to 1 is too steep for cattle and horses

All excavations intended to be used for large stock should be fenced in, and access given at one side only, which is generally termed the roadway. This should have a grade of from 4 to 1 to 5 to 1, and should be corduroyed or stone-pitched—the latter is more lasting and safer in every way. This can be done by making an excavation 7 to 8 inches deep, filling in with large stones placed on edge, all interstices being tightly wedged with small stones to an even surface and then blinded with gravel a few inches deep.

#### Inquire About Contract Rates.

The possibility of more efficient and cheaper work being done by contract should be explored by anyone considering the excavation of a tank. Very often essential cultivation work is abandoned in an attempt to carry out tank sinking with the farm team. In such cases it should prove a cheaper proposition to have the work done by contract. On the other hand, under cer tain circumstances ample time and horse-power are available to execute the work at a minimum of expense.

There are available to-day in some centres men who specialise in tank sinking and who, because of the extensive plant they employ, are in a position to undertake the work at a very reasonable and attractive figure. It is in their interests to do so, as the success of their venture depends very largely on continuity of work sufficient to justify the heavy capital expenditure on the plant they use.

#### The Scoop.

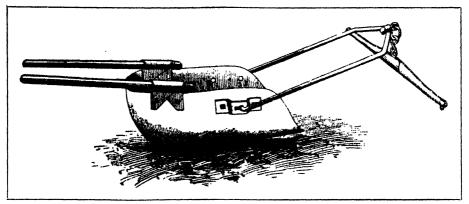
In the actual work of making the excavation a good deal depends on the implements used and the manner in which they are handled.

When tank sinking is undertaken it is desirable that the operation should be conducted with the utmost speed. Should rain be experienced during the course of the work, delay and increased cost result. In some cases, particularly where the work is well advanced, heavy rains may cause abandonment of the work before the requisite depth of excavation is attained.

Scoops of large capacity can invariably be reuted, and this procedure is often preferable to purchase. The same applies to the tank sinking plough.

For cleaning silt from tanks and for use as an auxiliary scoop in tank sinking the type of scoop illustrated is frequently used

On the bottom of this type of scoop are two rods of iron called cradles. These, after some use, wear thin, and should be removed and replaced. If this is not done the whole of the bottom of the scoop comes in contact with the ground, causing much more friction, and requiring considerably more exertion on the part of the horses. In the illustration the handle of the scoop is, as usual, straight, but some men prefer to have the handles bent upwards, arguing that less strength is then required to fill and turn the



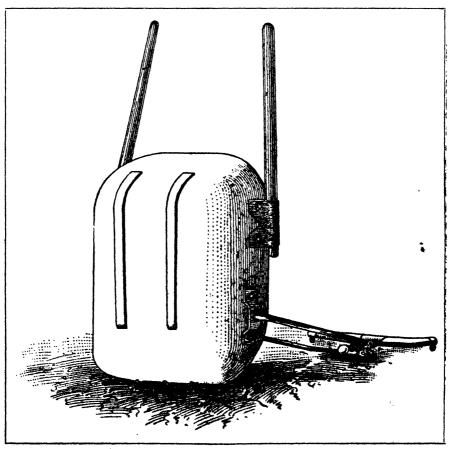
A Popular Type of Small Scoop

scoop. When scoops are new they are always bevelled on the *top* of the front edge of the mouth. This makes them hard to raise to the surface when full, and likely to "bite" and have a tendency to work downwards. When bevelled on the *bottom* of the front edge of the mouth, much less pressure on the handles sends them up, and they glide over the top of the loose earth without any trouble. When used for a consider-

able time the mouth of the scoop wears very thin, and will easily buckle. To counteract this a piece of quarter-inch steel, 5 inches wide, is riveted across the mouth and bevelled at the desired angle.

#### Removal of the Earth.

The ground should be carefully ploughed before scooping commences, particular attention being



Showing Cradles on Bottom of Scoop.

paid to the uniformity of depth, so that the scoop will not bob up and down. The earth on which the embankment is to be built should also be ploughed, so as to form a better bond with the removed earth. If this is not done there is a risk of the water percolating between the hard undisturbed soil and the loose soil of the embankment, causing "weeping," and creating the possibility of a breakaway.

A frequent error of judgment on the part of tank-sinkers is the practice of placing the first scoop of earth near the margin of the excavation. This means that the horses have to drag the next filled scoop over the banks so formed. It is obvious that the operations should be reversed, and the earth placed at the back first and the embankment built up from behind. To increase the storage capacity the embankment should be built well forward. Usually the earth is banked on two or three sides, but it is an advantage to bank it right round to prevent evaporation as much as possible.

#### Facilities for Inflow.

To get the water into the tank, pipes are laid under one bank and the silt tank placed just outside it; or the drain from the silt tank may be run directly into the corner of the tank, in which case the drain should be lined with old railway sleepers or slates to obviate erosion.

On small holdings, where the tanks can be kept under observation, some means should be devised to divert the water as soon as the tank is full. If the water is allowed to continue to flow into the tank it gradually silts up, and the water which overflows is clearer than the water which is flowing in.

A chute should be provided where the pipe enters the tank, and a drain made right round the edge, leading to the chute, for the purpose of preventing water from running down the banks and causing scouring.

#### Silt Tanks.

Usually one silt tank is provided, but it is a decided advantage to have two or more, as then more silt is deposited and the water reaches the tank in a cleaner condition. Every possible opportunity should be seized upon to keep the tanks clean. They should be kept under constant observation, and whenever the water gets low as much silt as possible should be removed. Many landholders have discovered at the commencement of a drought that tanks which they had thought contained several feet of water actually contained several feet of silt and only a few inches of water.

#### Drains.

Wide shallow drains, in which the flow of water is slower with consequently little scouring, are preferable to nariow deep ones. A drain 4 feet wide and 0 inches deep is much better than one 2 feet wide and 18 inches or 2 feet deep. When scouring is likely to take place the following method is very successful in preventing it:—A trench about 1 foot wide and 18 inches deep, and extending a couple of feet each side of the drain, is dug across it and filled with stone of

2 or 3 inch gauge. The efficacy of aprons such as this can be seen along roads and railways where they are used for the prevention of washaways. Where drains curve they should be widened; the sharper the curve the greater should the width be; and as a double safeguard an embankment can be placed on the outer side. Should drains meet before reaching the tank the main drain should be widened at the confluence, and the junction made at an acute angle. Otherwise considerable quantities of silt will settle.

It is highly desirable that the drains be run as far as possible on an even grade, and an ordinary home-made level such as used in erosion control work is ideal for securing a regular and even grade. Its use would obviate much of the erosion and silting so often seen in drains leading to tanks. Further, properly constructed and gently sloping drains tend to serve a larger catchment area than if an attempt is made to slope the drains steeply and to rely entirely upon the eye for their placement, etc.

Drains should always be kept in first-class order. When surface tanks are depended upon every shower is of importance, and unless the drains are clean, water from light showers does not reach the tank. Light road delvers are very useful for cleaning drains, but if the size of the holding does not warrant the purchase of such a delver, a crowder or delver should be made from a log or plank by the fitting of a steel point. A plough or shovel can also be used for this purpose.

Measuring Drains.

When the total length of drainage required runs to several miles it is a very tedious proceeding to measure for contractors' payment. The chain tape is in common use, but involves considerable risk of error. The following method used in measuring up road work is very simple, yet accurate, and could be applied to measuring drains, as well as fencing, etc.- A piece of white cloth is tied round the spoke of the wheel of a buggy, and the vehicle then advanced until the wheel has made a complete revolution. A mark having been made on the ground before starting, the circumference of the wheel is easily measured Then by driving along the proposed route of the drain, and counting the number of revolutions of the wheel, the total distance is easily arrived at. With two persons in the vehicle, one counting in tens, and calling "ten" each time, and the driver counting the number of "tens," there is no danger of mistake. When, for example, the driver has counted 43 "tens," and the other man has six towards the next ten, the number of revolutions must be 436. If the wheel were 14 ft. 8 in. in circumference, then the total distance would be 6,394 ft. 8 in., or nearly 97 chains.

#### To Measure Capacities of Tanks.

It is very useful to be able to calculate at any time the amount of water in existing tanks, or to be able to estimate the capacities of new tanks. This latter figure is necessary when computing payment for contract work. It is also handy to be able to determine the dimensions of a tank to hold a specified amount of water.

Rules for making these calculations were given

in October issue of this journal.

## FOR FLYSTRIKE

### " C.B.E."

(Camphor-Boracic Emulsion)

A liquid dressing in 1 gal. drums. Requires addition of 30° water only, before use. For studs or flock sheep. 12/6 per gal., f.o.r. Sydney.

### "Flyacide."

(B.T.B.-15)

Also for dressing rams' heads, shearing cuts and for lamb marking.

2 gal. cartons ... 9/12 gal. cartons ... 54/-, f.o.r. Sydney
Up to 4 gals. "Flyacide" Concentrate may
be sent by post. Postage to any address in
N.S.W. on 2 gals., 2/-, on 4 gals, 2/9.

# GRAZCOS

The Graziers' Co-operative Shearing Co. Ltd. GRAZCOS HOUSE: 46 YOUNG STREET, SYDNEY

### **EVERYDAY ELECTRIC FENCERS**

SOLVE WIRE AND LABOUR SHORTAGE & SAVE 80% FENCING COSTS

One man can fence 10 acres in half a day. All you need—light posts 30 feet apart and ONE wire connected to an Everyday Electric Fencer. Holds stubborn stock better than a five or six-wire fence. Safe 6-volt Battery charges up to 20 miles of fence. Price, £7/15/0, complete with 50 insulators. Battery extra. You take no risk, we will refund your money within 30 days if you are not satisfied.



Write for interesting catalogue and full particulars.



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This handy type flame-thrower is carried on the back and is simple to operate. Destroys noxious weeds, pests and insects. Also suitable for spraying vegetables.

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### EVERYDAY PRODUCTS Pty. Ltd.

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BALE IT

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Easy filling Less Manpower Less cost -Saves time Feed when

No magpie The tamping

little Baler

that makes

--- Saves a job of it Space

Stow Away in Half the Space

uzacoii-Wolseley Lid.

7-11 MARKET STREET, SYDNEY.

### Approved Seed.

### November, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list cach month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twenty-five for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above.

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in

the Department and information will be supplied regarding it to inquirers.

Cauliflowers.

Shorts-H. Burton Bardley, Sherwood Farm, Moorland.

Hawkesbury Solid White—E. A. Sharp, 110

Gordon-avenue, Hamilton.
Phenomenal Five Months—E. A. Sharp, 110
Gordon-avenue, Hamilton.

Tonatoes.

Marvana — Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta. Australian Earliana--Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 05—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

### Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recommended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:—

Cauliflowers—

Hawkesbury Solid White, Nugget, Shorts.

Hunter River White.

Grain Sorghum— Kalo.

Maise -

Learning, Golden Superb, Fitzroy, Funk's Yellow Deut.

Pumpkins---

Queensland Blue.

Grasses, etc -

Phalaris tuberosa, Subterrancan Clover (midseason), Sheep's Burnet, Lucerne.

### Cattle Tick Eradication: Methods Based on World Experience.

Is its fight against the cattle tick, as against other posts, the Department of Agriculture keeps itself well informed as to the methods adopted and the success achieved in other countries of the world.

It would appear that some of those who make statements in regard to tick eradication methods in New South Wales are unaware that similar methods have been, and are being used in other countries. It has, for instance, been claimed, at times, that eradication might be seriously interfered with by the spread of tick by wild animals,

fered with by the spread of tick by wild animals. In the State of Florida, United States, in 1036 and 1037, careful search of birds and mammals showed that wild animals other than deer do not serve as hosts for the cattle tick, though ticks of eight other species were found on four species of

birds and twelve mammals. In the island of Porto Rico, where the cattle industry has been seriously hindered by tick, both on account of the direct injury it causes to the animals through irritation, and its debilitating effect, and also because it transmits tick fever, the same results have been secured. A recent report from that country states that, whilst the tick was found in considerable numbers on goats, sheep and horses (and those animals must be taken into account in an eradication campaign—other animals are of little or no importance.

It is noted that at Porto Rico the dip being used is almost exactly of the same strength as that used in this country, and has been found effective in destroying cattle tick.

# Help Win the War. Keep On Buying War Savings Certificates.

### FEEDS AND FEEDING NOTES.

November, 1942.

IN October issue a commencement was made with periodical reviews of current costs and values on a unit basis, of feeds available to those who have to buy feed for any class of animal, and a description was given of the methods of determining the costs of units of actual nutriment in the feeds. During the past month there has been very little alteration in the feed position as regards supply or price, and wheat and barley are still the cheapest starch-rich feeds and meat-meal the cheapest protein-rich feed. Some of the roughages have decreased in price and oats has increased slightly. The table on page 501 covers the changes in the prices of some feeds since last month and includes an additional feed—oat bran.

Briefly the method of determining the cost of starch and protein units is to divide the cost of 100 lb. of a feed by the number of starch units and protein units respectively, in 100 lb. of the feed. To find the cost of starch unit in lucerne hay and in oaten and wheaten chaff, for example, divide the cwt. price by 45; with oaten and wheaten hay divide by 40. To find the cost of starch units in maize and wheat, divide the bushel price by 44; with oats divide by 25; and with barley by 36.

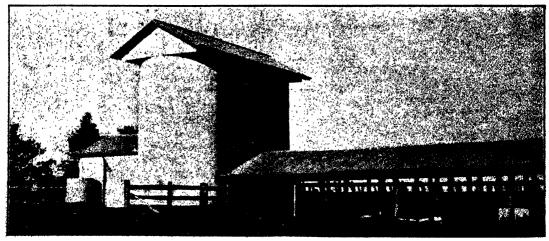
### Comparisons of Feeds of Equal Unit Cost.

As indicated last month, the unit cost figures do not take into account many points of practical importance, and it is often difficult to decide between two feeds of which the cost of starch or protein units is about the same. The following facts may influence the decision as to which feed would be the better purchase:—

(1) Good lucerne chaff or hay should always be given a slight premium over other

roughages, especially if green feed is low or there is little clover in the feed. This is on account of the higher protein, calcium and Vitamin A content of lucerne hay.

- (2) Oats and bran should always be given a slight premium over other feeds on account of their bulkiness and palatability. Thus, if barley and oats were the same as regards cost of starch units, oats on account of its palatability and ease with which it is fed, would be the indicated feed.
- (3) Animal protein concentrates, as meat meal and liver meal, on account of higher nutritional value of their protein as compared with the protein of oil meals and grain bi-products, should be given a premium over other feeds, especially when feeding pigs, poultry and sheep. However, if it is desired to use oil meal to give a sheen to the coats of show animals, linseed meal could, of course, be given a large premium over other meals.



Feed.	Starch Units per 100 lb. Protein Units per 100 lb.		Cost.	Cost per Starch Unit.	Cost per Protein Unit.	Remarks.
***************************************			Roughages.			PROPERTY IS NO SEEN IN SECURIOR COLUMN TO A PER AN IN COMMUNICATION OF CONTRACTOR CONTRA
Lucerne Hay or Chaff	35-45 (average quality 40)	9	£8 to £10 long ton*	2·1d. – 2·7d.		A fall in price since last month New season outen hay appears to be the best buying in
New Season Wheaten Hav.	33	3	£6 5s. to £7 ros. long	2 od2·4d.		roughages, but grains are still indicated as main part
New Season Oaten Hay	33	3	£5 ros. long ton*	1·8d.		of the rations wherever
Oaten and Wheaten Chaff.	40	3	fo to fir long ton* .	2·4d 3·0d.		Dearer than hays.
Oaten Straw	20	0.6	£7 long ton* £7 ros. long ton* £3 r5s. long ton*	3·8d.	l	Straws too dear for feed
Wheaten Straw	14	0.1	£7 ros. long ton*	5.6d.		f purposes.
Oat Hulls	21	0-5	£3 755. long ton*	ı∙9d.		A comparatively cheap source of roughage.
Rice Hulls	3	0.3	***************************************			Not worth buying as feed at any price.
			Starchy Concentr	ates.		
Maize	78	. 8	7s. bushel	1.0d.	١	Too expensive for feed purposes.
Maize Meal	78	8	£14 short ton†	2·2d.		An expensive meal at present
Wheat	72	8	3s. 8d. bushel	ıd.	1	) Wheat and barley are both chear
Wheat Meal	72	8	It to It ios, short tout	1 · 2 d.		feeds. Will probably pay to
Barley	71	7	3s. bushel £7 5s. short ton* 3s. 5d. bushel .	ıd.		crush own grain if possible
Barley Meal	71	7	£7 55. Short ton*	1.2d.		instead of buying it as a meal.
Oats	62	<u>ا</u>	35, 5d. bushel	1.5d.		Price of oats and crushed oats
Crushed Oats .	62	8	35. 9d. to 45. per 40 lb	1.8d. · 1.0d.		has risen slightly.
Wheat Bran	55	10	£6 short tonf	1-3d.	•••	Bran worth buying when available for use as part of darry and poultry rations to improve the texture.
Wheat Pollard	66	10	£6 short ton†		•••	Pollard good buying , when available.
Hounny Meal	78	8	£18 short ton†	2·8d.		An expensive feed at this price.
Rice Meal	73	6-5				None available.
Rice Pollard		7				None available.
Molasses	50	1	£3 10844-gallon drum (515 lb).	·	•••	Supplies short. Only worth buying for drought use.
Oat Bran	46	4	L5 5°. short ton†		i	A bulky feed; supplies limited.
			Protein Concentr	ates.		
Meat Meal (to per cent.) crude protein).	80	55	fio ros. short tont		2·3d.	Supplies short. Should only be used for pig and poultry
Blood Meal	66	67	Cra short tont		2·5d.	industry. Supplies available.
Liver Meal		58	Cra short tont	•••	2.3d.	Supplies available.
Fish Meal (60 per cent. crude protein).	94 59	53	£14 short ton†	•••••	2-90.	None available.
Linseed Meal	72	25	fo ios. to fio ios. short	1·6d.—1·7d.	4·5d5d.	Stocks will stand increased demands.
Peanut Meal	78	43	£6 ros. short ton† .	1·1d.	1-8d.	Supplies limited, but the cheapest protein concentrate.
Coroanut Meal .	76	16	£7 10s. short ton t	1·2d.	5·7d.	Supplies short and sales limited
Maize Gluten	78 78	20	£9 short ton ton		5·4d.	Supplies limited.

### \* Long ton = 2,240 lb.

### Restriction on Stock Licks and on Phosphates and Salt for Sheep.

The most interesting item during the past month from a feeding point of view is the much discussed "Stock Foods and Remedies Order" issued by the Department of War Organisation of Industry. The following explanatory statement has been issued by the Department of Information.

UNDER the Control of Stock Foods and Remedies Order, made recently by the Minister for War Organisation of Industry, the manufacture of stock licks has been prohibited (except for mixtures of salt with copper or cobalt), the use of phosphates for consumption by sheep has been prohibited and salt for sheep can only be procured on a permit from the State Veterinary Authorities.

These permits to purchase salt for sheep will be given:—

(a) When sheep are grazing in areas that are deficient in copper or cobalt and salt is necessary to induce the sheep to consume the very small loses of copper or cobalt required for health. The areas where copper or cobalt deficiency exists are well known and are mainly in South Australia and West Australia.

(b) When sheep are being fed mainly on cereal grains and it is necessary to supply them with an additional ration of lime. Here again, the salt is needed as a bait to make the sheep consume carbonate of lime.

(c) The Chief Veterinary Officer of the State may give sheepowners permits to purchase salt in any other exceptional circumstances which warrant it.

<sup>†</sup> Short ton = 2,000 lb.

The feeding of salt to sheep is a very oldestablished practice, and the use of proprietary stock licks containing various minerals has become widespread in Australia in recent years. It is natural, therefore, that the restrictions now imposed should cause anxiety to some owners of livestock who fear that their flocks and herds may suffer in consequence. It is for that reason that this statement is made, setting out the true position and the reasons for the restrictions.

Before the restrictions were imposed they were discussed with the Veterinary authorities in all States and with the Division of Animal Health and Nutrition of the Council for Scientific and Industrial Research. Approval was unanimous for the reasons which are set out in this statement.

Apart from phosphate and salt, the ingredients commonly used in stock licks are iron, sulphur, iodine and magnesium. With one exception, there is no evidence that livestock in Australia suffer from a deficiency of any of these minerals, and since they obtain all they require from their diet it is quite unnecessary, and hence wasteful and

The order also provides for salt to be obtained on permit when sheep are being fed cereal grains and need to be provided with additional lime. There is no need for mixtures of salt and lime to be manufactured. If stock are being fed on meal mixtures, it is best to add the ground carbonate of lime to the feed and thus ensure that it is taken. When whole grain is fed to sheep the lime may be provided in the form of a lick. This is merely a mixture of equal parts of salt and carbonate of lime which the owner can readily make for himself. The order provides for salt to be purchased for this purpose.

As regards phosphates, it has already been mentioned that the soils and pastures of some parts of Australia are low in phosphate content. Under these conditions cattle, particularly milking cows and breeding stock, benefit from an additional ration of phosphate but sheep do not. It is not necessary here to discuss the reasons for this, but it can be said that extensive experiments, continued over a number of years and carried out in widely separated parts of Australia, including Queensland, New South Wales, South Australia and West Australia have shown, beyond



uneconomic to continue providing them in the form of licks. The one exception is that pigs under artificial conditious, in pens with concrete or wooden floors may suffer from a deficiency of iron which they normally obtain from soil eaten with their food. No special mineral mixture is required here, however. Iron salts can be, and commonly are, purchased as such and added to the diet. Every State Department of Agriculture constantly gives advice on this.

It is useless to give additional minerals to stock unless they are suffering from an actual deficiency. In Australia there are deficiencies in certain areas of copper, cobalt and phosphate, and when stock are fed largely on cereal grains additional lime may be required.

The deficiencies of copper and cobalt have already been referred to The manufacture and sale of mixtures containing salt, copper and cobalt is still permitted by the order.

doubt, that sheep are not benefited by giving them additional phosphate, even though the amount they derive from the feed may be extremely low. In spite of the publication of these results, many tons of phosphate were still being wasted in licks for sheep, although Australia needs all the phosphate that can be obtained from bone or mineral sources to make good the serious shortage of phosphatic fertilisers. The order, therefore, prohibits the use of phosphates for sheep.

There is no restriction on phosphates for cattle, but specially manufactured licks for this purpose are unnecessary. In the case of dairy cows, where the need is greatest, it is much better to add the phosphate to the ration when feeding and thus ensure that it is consumed. The consumption of licks by stock is very irregular, and some animals do not take them at all. Where beef cattle are concerned a simple mix of salt and phosphate can be used, and this throws no great strain on the labour available.



"MEGGITT'S" is a concentrate which supplies the necessary nutriments essential to the raising of pigs and calves with and without skim milk.

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Individual ration advice on the feeding of all your stock forwarded free of obligation on request. State details of pastures available, fodders, etc.

### AMPLE SUPPLIES!

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Food and clothing for the Fighting Forces the Industrial Army and the civilians, all of whom are doing their share to wir the war. The Land Army has a vast tob to do—huge areas of coreals to grow and harvest—fruit trees to be oil sprayed to ensure sound fruit—to provide sheep and cattle for meat—sugar and vegetables for bodily health and strength—wool to be shorn and woven into cloth for clothing etc. otc.

Behind all this is machinery of every description—tractors harvesters wheels, pistons and moving paris—all to be lubricated, special Oils are needed right throughout

Shell plays a vital part in providing these essential Lubricants that keep the wheels of primary production forever turning.

YOU CAN BE SURE OF

## SHELLWOTOROIL

It's Drag-Free

THE SHELL COMPANY OF AUSTRALIA LIMITED (Incorporated in England)

So far then, it is clear that the restrictions imposed will effect considerable savings and that they will not affect the livestock industry adversely

in any way.

There remains for discussion the restriction placed on the use of salt for sheep. This has come as a surprise to many people who have assumed that salt was essential and that sheep would die, or at least fail to thrive, without it The reasons for believing this assumption to be

wrong are therefore given.

The fact that sheep will consume salt when it is offered to them is not proof that they need it. Sheep grazing on coastal areas which are continually subject to wind-borne spray from the sea will still consume salt if it is offered to them, in spite of the additional quantity they obtain from the feed Many graziers do not provide their sheep with salt and others have given up doing so, on advice, and no harm has resulted. Sheep have been kept on dry feed in pens and in various field experiments for some years without salt and have not suffered The Council for Scientific and Industrial Research has carried out a controlled experiment in South Australia, lasting three years, in which some sheep received as much salt as they liked to take and others received no salt at all. Those receiving salt showed no benefit from it whatever. At the National Field Station, Gilruth Plans, Cunnamulla, which is conducted by C.S.I.R., all licks and salt have been withdrawn from the paddocks. An experimental flock of ewes near Armidale, N.S.W., has been maintained under natural conditions since 1938 without salt. They have thrived and lambed normally. In a field trial in New England one group of sheep has been kept under continuous grazing and another group under rotational grazing. The group grazed continuously thrived

normally and grew average fleeces. The group grazed in rotation showed phenomenal growth and cut unusually heavy fleeces for the district. Neither group received salt nor any kind of lick throughout the experiment.

Other evidence could be quoted, but the above should be sufficient to show that salt is *not* essential for sheep except in special circumstances. The order provides that when those special circumstances exist a permit to purchase salt for sheep can be obtained.

Finally, let us turn for a moment to what is, after all, the most important aspect of the matter. It is estimated that from 30,000 to 50,000 tons of salt are used annually for livestock in Australia. Much the greater part of this is used for sheep, and except in special circumstances, which are provided for in the order, this is unnecessary. As the Chief of the Division of Animal Health and Nutrition of C.S.I.R. said in a broadcast address which was put over all national stations in May last: "Common salt is commonly offered to sheep in the form of a lick, but there is nothing to show that under Australian conditions this practice is anything but wasteful and uneconomic" Think of the manpower required to harvest, prepare and load 30,000 to 50,000 tons of salt, and of the railway trucks needed to transport it from place to place. And think, too, of the fact, which is not generally realised, that salt is in short supply owing to manpower and transport difficul-The demand for it for human consumption must be met, and it is widely used in numerous essential manufacturing processes. Large supplies are needed for munition making. Is it not better then, that what can be spared for livestock should be conserved for necessary use rather than permit it to be used indiscriminately and needlessly.

#### For National Security-Prevent Bush Fires.

"I APPLAL to you to help during the bush fire months which lie ahead. Never forget—the the match carclessly thrown down, the camp fire unextinguished, the cigarette butt cast away in a moment of thoughtlessness, can destroy thousands of acres of crops and burn down State forests with their millions of feet of urgently needed timber. That means a crippling of our war effort at its source.

"Think carefully! The results of carelessness can be just the same as those caused by Japanese mendiary bombs. That is why bush fires here would be great news in Tokio. Whatever helps our enemies must be bad for us. They would dearly love to set the country-side ablaze from end to end. By causing bush fires we become agents for the enemy and a menace to Australia."—An appeal by Hon. J. M. BADDELEY, M.L.A., Chief Secretary.

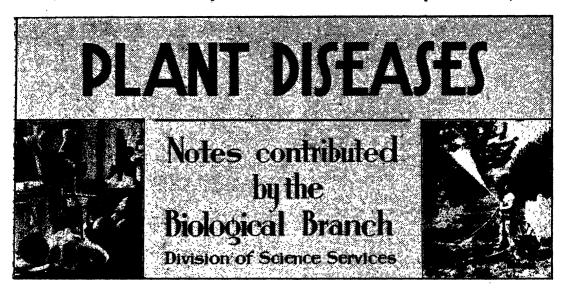
#### Town Labour Proves Its Worth.

LABOUR groups of townspeople have been organised in numerous centres, and reports are reaching us frequently in praise of the excellent work they are doing. The willingness and enthusiasm of labour drawn from towns apparently more than compensate for the earlier suggestion of inexpertness.

The following account of achievement comes from the West Wyalong War Agricultural Committee and is typical of what is being done, in many cases on a much larger scale, in other

towns throughout the State.

A group of four employees of one of West Wyalong's largest stores volunteered to stook the hay crop for a local farmer who, in addition to being short of labour, was himself confined to hospital. They put in their mid-week half-holiday on the job, and stooked 25 tons of hay to the entire satisfaction of the owner's brother, who supervised the work This job may have been a comparatively small one, but it is the method of getting it done that is all-important. Furthermore, every 25 tons of hay counts.



#### DISEASES OF CABBAGES, CAULIFLOWERS AND TURNIPS.

DISEASES of the cabbage family are preventable by the simple means of disinfection of the seed by the hot-water method before sowing, rotation of crops and choice of land which will not render crops liable to malnutritional diseases.

#### Black Rot.

Black rot is one of the most serious diseases of crucifer crops, which, in addition to cabbage, cauliflower and turnips, include Brussels sprouts, kohlrabi, radish and kale. It is caused by a parasitic bacterium which is seed-borne, and which, under wet conditions, spreads rapidly in the seed bed and in the field.

Infection in the seedling stages causes the wilting and death of lower leaves and sometimes of the plant. In other cases, infection is not noticeable until after the seedlings have been planted out in the field. Under dry conditions, the disease develops slowly or not at all. Infection of older plants usually takes place by way of leaf margins, whence it spreads to the stem and throughout the plant, causing death of the leaves. The characteristic feature of the disease is the blackening of veins of affected leaves and of the woody parts of the stems, which can be seen if an affected leaf is broken away from the stem or if the stem is cut across.

Losses from black rot may be prevented by seed treatment and crop rotation.

#### Sclerotinia Rot.

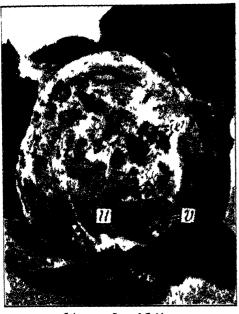
Sclerotinia rot is caused by a parasitic fungus, and may be very serious in autumn and spring crops of cabbages and cauliflowers if wet conditions occur. Greatest



Black Rot.

Leaf margins become yellowish and dry out, and the disease spreads inwards along the veins to the midrib and stem. Outer leaves are affected first.

[After Walker.



Science and the fundamental series of the fundamental series is a first which spreads rapidly. This illustration shows as the provided for the fundamental series (n) with string tellics which are at first white (t) and laterable kindlard (u)

1fter Br un and Butler

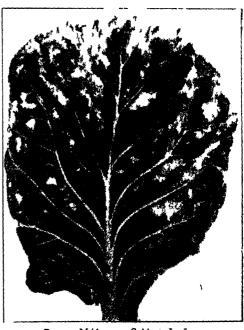


Wire Stem of Young Cabbage
The outer tissues—f the stem it he und level become
brown and shrunken

[After Weber



A Young Cabbage Leaf, showing the Downy Growth of the Mildew Fungus on the M Under-surface [After Weber



Downy Mildew on Cabbage Leaf Affected leaves are mottled with vellow in a characteristic manner

losses from the rot are experienced as the crop is nearing maturity. The fungus produces irregularly-shaped black resting bodies, called sclerotia, in the decayed tissue, which serve to identify the disease. These bodies are very resistant to weather conditions and remain in the soil after the crop has been harvested, producing, in the following autumn, the spores to start infection of the next crop. Control of sclerotinia rot depends on the destruction of sclerotia to prevent their carry-over to the following year. Burn, or deeply bury, diseased plants, and practise crop rotation.

#### Downy Mildew.

Downy mildew is a fungous disease which attacks all varieties of crucifers. In a wet season it may be highly destructive in the seedbed. Pale-green or yellowish spots with speckled markings develop on the leaves, and on the undersurface of these spots the fungus can be seen as a downy growth. Diseased leaves shrivel and young plants may be killed. The disease is also seen after planting out, but is rarely of importance. Downy mildew may be checked by spraying the seedbed with Bordeaux mixture at weekly intervals.

#### Diseases caused by the Fungus Rhizoctonia.

According to the stage at which the plant is attacked, this fungus causes damping-off of seedlings, wire stem, or root rot and bottom rot. Infection takes place in the seed-bed. Young seedlings may be killed at once. Older, harder plants may not quickly collapse, but the stem at ground level is attacked and the outer, soft tissues become brown and shrunken (wire stem). Seedlings showing no obvious signs of attack in seed-beds where the disease has occurred may be slightly infected, and when planted out in the field the disease may extend, causing brown lesions on the root, which, in serious cases, extend up the stem to the head. In this stage the disease is liable to be confused with sclerotinia rot. It can be distinguished by the dark coloured stem lesions and the absence of the white cottony growth and large black sclerotia.

Losses caused by the Rhizoctonia fungus may be prevented by using new or diseasefree soil for the seed-bed, or, if necessary, soil which has been sterilised. Sort out wire stem plants when transplanting.

#### Black Leg.

Black leg is a fungous disease which can attack all parts of the plant. Like black rot it is seed-borne. In the seedling stage the lower stem and roots are rotted. In older plants lesions, black in colour, occur on the stalk and leaf-stalk, and angular greyish spots develop on the leaf blades. A dry rot of turnip roots may cause losses in storage.

Black leg may be controlled by seed treatment and crop rotation.



Cabbage Root affected with Black Leg.

#### Club Root.

Club root is the name given to an abnormal enlargement of the roots of crucifers, which is common in old cultivated areas. The effect of the root disturbance is eventually to stunt the plant, and, in severe cases, cause wilting in the middle of the day. Club root is caused by

a fungus, the spores of which remain in the soil for a long period; so that when once infested the soil may remain so for an indefinite period. The fungus is, however, sensitive to alkaline conditions, and if an



Dry Rot of Swede Turnips.

infested soil is made alkaline (pH 7.2 or above) by liming, and kept uniformly moist, little or no infection will occur when it is again planted to crucifers.

#### Leaf Spot.

Three rather similar leaf spots are caused by different fungi—the spot due to the black leg fungus, ring spot and Alternaria leaf spot. Ring spot is common on the old outer leaves of cauliflower and cabbage, especially in cool, damp weather. The disease is rarely sufficiently serious to necessitate control measures. Alternaria spot is usually only serious on cauliflowers. As well as causing a dark-brownish leaf spot of maturing leaves, parts of the flower and seed head may be attacked and killed, reducing the yield of seed.

Peppery Leaf Spot is caused by a bacterium which attacks the leaves of cauliflowers, resulting in the formation of small, brownish or purplish spots. It is rarely of

cconomic importance.

Losses from this and other leaf spots are prevented by hot water treatment of the seed and crop rotation

#### Magnesium Deficiency.

Magnesium deficiency is a common trouble in cabbage and cauliflower crops in many of the coastal soils of New South Wales. Yellowish areas of a characteristic type develop between the veins and around the leaf margins, and plants make poor growth. The deficiency can usually be provided against by the application of dolomitic lime (2 tons per acre), preferably a vear before the crucifer crop is planted.

#### Potash Deficiency.

Cabbage is a heavy user of potash, and in crops in sandy coastal soils symptoms indicating a deficiency of this element may appear. These take the form of yellowing of the foliage between the veins, and particularly around the margins of the outer leaves where the tissue eventually dies and becomes brittle.



Swollen and Spindle-shaped Roots Caused by the Club-root Organism.

[After Walker.

#### Whiptail.

Whiptail is the name applied to a serious disease of cauliflowers characterised by narrow, ruffled and distorted leaves. It occurs most commonly in the short-reason

varieties of the Snowball and Nugget type, and especially in dry seasons. The cause of the disease is somewhat obscure. It is associated with highly acid soils and its occurrence, in most years, can be prevented by the application of lime to change the soil reaction to a neutral or mildly acid condition some months before the crop is planted. Usually 1½ to 2 tons per acre of lime are required.

## Control Measures. Seed Treatment.

Seed of crucifers should be disinfected, before sowing, to prevent the introduction of black rot or black leg. It is strongly recommended that this precaution be taken unless the seed is known to be disease-free, or to have been disinfected previously by the hot-water method. This treatment kills the parasites while leaving the seed unharmed.

The the seed loosely, ¼ lb. at a time, in cheesecloth bags and suspend in 3 or 4 gallons of water previously heated to 122 deg. Fahr. (or 50 deg. C). After treatment, quickly spread out the seed to dry in the shade. A kerosene tin, provided with a wooden lid in which two holes are bored, one for the thermometer and the other for a stirring stick, is a convenient apparatus for the hot water treatment. The temperature may be maintained by means of a small flame, or the tin may be insulated by packing in a box of straw and the correct temperature obtained by first pouring in boiling and then cold water.

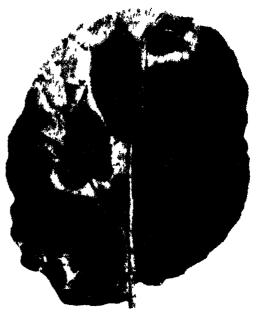
If weak seed is given the hot-water treatment, its germination will be lowered. If doubt exists about the vitality of the seed, run a trial treatment first with a small quantity of seed, followed by a germination test.

It is hardly necessary to stress the need for making certain that seedlings raised outside the farm do not introduce diseases when brought in.

#### Care in the Seed-bed.

The spread of many of the diseases of cabbage and cauliflower is started in the seed-bed, and the diseases are distributed on the seedlings to non-infested land. The mistake is often made of placing the bed on old cabbage or cauliflower land where diseases have been present, or adjacent to

an earlier planted crucifer crop. Where possible, the seed-bed should be relatively isolated and be located on new soil, sterilised soil, or soil which has not grown crucifers for several years. If on new land, the seed-bed will be improved by a dressing of agricultural hydrate of lime at the rate of I lb. per square yard a month or



Alternaria Leaf-apot of Cabbage | After Weber.

two before sowing the seed. It is advisable to give attention early to the control of cabbage moth and aphids, and, if the season is wet, of downy mildew, damping-off and



Broccoli Heads.

Left.—Infected with Alternaria. Right —Healthy.

[After Weber.

wire stem as well. A suitable combined spray for this purpose may be prepared by adding nicotine and arsenate of lead to Bordeaux mixture.

To make 2½ gallons of Bordeaux mixture, dissolve 4 oz. bluestone in 2 gallons water. This can be done quickly by using a little hot water. Use only a copper, wooden, or earthenware vessel for the bluestone. Slake 4 oz. quick lime with a small quantity of water and make up to ½ gallon. If hydrated lime is used, half as much again will be required. Pour the lime mixture through a fine strainer into the bluestone solution, stirring all the time. Add I fluid oz. of nicotine sulphate (Blackleaf 40), I



Ring Spot of Cabbage Leaf.
The spots are large dark grey and concentrically zone d

oz. of arsenate of lead, and 5 fluid oz. of white oil, to improve its wetting qualities. To get the best coverage, apply the spray horizontally so as to wet the under-surfaces of the leaves and kill the downy mildew fungus, and use a very fine nozzle, since a coarse spray runs off. Commence spraying when the seedlings are about an inch high, and repeat each week.

Cabbage and cauliflower seed-beds are best sown in drills 4 to 6 inches apart. This facilitates the application of spray, weeding is easier, and at transplanting time less dis-



Whiptail can be Reduced Greatly by Liming.

turbance to the roots will be caused than if the seed is sown broadcast. Also, every second row can be used first if more than one planting is to be made from the bed.

#### Choice of Land and Crop Rotation.

Crucifer crops thrive best in soils which are practically neutral in reaction. Most of our coastal soils as well as some of our tableland and inland soils are very strongly acid in their virgin state, and to produce good crops of cabbages and cauliflowers, need substantial applications of lime (1½ to 2 tons of agricultural hydrate, or finely ground carbonate of lime, per acre) The lime is broadcast and ploughed in a month or two before the seedlings are planted out. If this is done, losses from whiptail rarely occur

Where the soil is extremely acid (more acid than pH 50), deficiency diseases may occur. Extremely acid soils arise usually



Yellow Interveinal Mottling Indicates Insufficient Magnesium in the Soil.

from the leaching out or washing to lower levels of the lime, magnesium and potash reserves of the soil, and heavy application of lime and dolomitic lime (3-4 tons per acre), and sometimes potash fertiliser (2 or more cwt. per acre), become necessary before such soils can be rendered highly productive for crucifers. If the soil is of a sandy nature, the ploughing in of farmyard manure (several tons per acre) may be also necessary. In many cases, it will be found best to avoid extremely acid soils, reserving them for crops other than crucifers.

It may be best to avoid, also, land on which the organism which causes club root disease has established itself. Unfortunately, this fungus frequently occurs in patches in otherwise desirable paddocks, and the wise procedure in such cases is to

lime heavily these patches. Usually about 3 tons per acre of agricultural hydrate or finely ground carbonate of lime are necessary to render the soil in such patches alkaline or unfavourable for the club root fungus.

Almost all the parasites which affect crucifers are able to survive on refuse left in the soil from preceding diseased crops, and no sounder advice can be given than to practise crop rotation; allowing at least two or three years between crops of plants belonging to this family. Where several plantings of crucifers are being made during a season, it is advisable not to make fresh plantings adjacent to mature areas. This practice is most serious from the point of view of maintenance of insect populations, but if black rot is present in a crop, its spread will be greatly increased by heavy infestations of cabbage moth.

#### Tasmanian Potato Seed Available.

THE Minister for Agriculture, the Hon. W. F. Dunn, has announced that the Commonwealth Government, after giving careful consideration to the general food position and transport difficulties, had asked that New South Wales be self-ties, had asked that normally this State grows only approximately one-third of its pre-war consumption, the magnitude of the task may be realised.

Owing to the extreme shortage of local seed for planting this increased acreage, it has been decided to import as much Tasmanian Brownell seed as is available to assist in making up the leeway. As this variety is not the most suitable for New South Wales conditions, the Commonwealth Government has decided, as an added inducement to growers, to make seed available at fo per ton f.o.r. Sydney, which is considerably below the market rate. This seed will be supplied only to growers situated in Tableland districts.

A condition attached to the supply of this seed is that the grower will purchase it at the full market rate, and the Commonwealth Government

will rebate to the grower such an amount as will reduce the price to 10 per ton f.o.r. Sydney. This rebate will not be paid unless and until the Commonwealth Government has obtained authoritative evidence that all the seed supplied to a grower has been planted under contract. A certificate from an officer of the Department of Agriculture will be accepted for such purpose.

To enable growers who have difficulty in regard to finance for the purchase of this seed under the scheme, arrangements have been made by the State Government, acting through the Rural Bank, to make the necessary advances to growers. Because of the lateness of the season and the national importance of the project, assurances have been given that applications for advances will be given priority and dealt with promptly.

Further particulars are available from the local branch of the Rural Bank, or direct from the Rural Industries Agency, Rural Bank of New South Wales, Martin-place, Sydney; or local officers of the Department of Agriculture.

#### An Excellent Reference Work on Poisonous Plants.

"THE Poison Plants of New South Wales" (compiled by Mrs. Evelyn Hurst and published by the N.S.W. Poison Plants Committee) brings together all previously published and unpublished information on the poisonous plants of New South Wales

tion on the poisonous plants of New South Wales.
The plant species dealt with are arranged alphabetically in botanical families. In most cases botanical descriptions are given, and those wishing to use these descriptions for identification purposes will find the glossary of technical terms at

the end of the book most helpful. Also within the book's 500 pages are included a bibliography, index and many line blocks.

Research workers, veterinarians, pastoralists and agriculturists should welcome the publication of this handy reference work; it fills a long-felt want. Copies may be obtained from the Department of Agriculture, Box 36A, G.P.O., Sydney, the price being 10s. 9d. posted.

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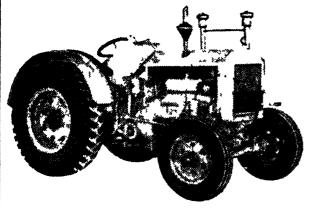
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# INSECT PESTS. Notes contributed by the Entomological branch.

#### PESTS OF BEANS.

IN most seasons, the principal pests of beans are the bean fly (Agromuza phascoli), red spider (Tetranychus urticae), the green vegetable bug (Vezaro viridula), thrips (Thysanoptera), aphids or plant lice (Aphis spp.), and the bean weevil (Bruchus obtectus). In some seasons, or in localised areas, the following insects may occur in pest numbers:—Green mirid bug (Megacoclum modestum), pseudo-loopers (Plusia spp.), the tomato moth (Heliothis armigera), the bean leaf-hopper (Empoasca sp.), the bean butterfly (Zizceria labradus) and the bean-pod borer (Mainea testulalis).

#### The Bean Fly.

The bean fly is essentially a coastal pest in New South Wales, where it occurs from the Queensland border to as far south as

Wollongong. It has been recorded, however, as a summer pest of beans in the Moree district, during the past two seasons. The bean fly infests all our varieties of climbing or bush types of chible beans of the genus *Phaseolus*.

The adults are small black flies which measure about 1/12th of an inch in length, and they may be seen on the leaves of

the plants as soon as they are well through the ground. The eggs, which are laid singly in the upper surfaces of the leaves, hatch within two days in warm weather. The young maggots or larvae at first tunnel through the leaf, then commence to burrow down the leaf-stalk and finally make their way down through the stem

> The larvae, which become fully-fed in about eight or nine days, enter their pupal stage within the stems, and about nine or ten days later the adult fliesem rge. The life-cycle from egg to adult may occupy less than three weeks in summer, but under cooler conditions development is much slower, and the period occurried may be



almost three and a half months.

During the winter there is a heavy mortality of all stages of the fly, and with the greatly reduced rate of development, very

few flies survive to infest spring crops. Infestation is usually extremely light in all sowings made between June and October, but in most areas, by about the end of December, the flies have so increased in numbers that they cause severe infestation in sowings made at this period. Infestation usually continues to be severe, along the central coast until about the end of April and on the north coast until about the end of May.

As the larvae destroy all the inner tissues of the stems, severely infested plants turn yellow when they are about eight or ten days old and commence to fall over and to die off. In lighter infestations the plants become yellow and their stems swollen and cracked, and they are easily broken off by wind, but otherwise their yield may be satisfactory unless weather conditions are dry.

#### CONTROL.

The following spray is recommended for the control of this pest:—

Nicotine sulphate .. I fluid oz. White oil emulsion .. 6½ fluid oz. Water .. .. 4 gallons.

It is important that the first application of spray be made when the first plants which show through the ground in any particular sowing, are not more than three days old. For instance, plants commencing to show, say, on Monday morning, should be sprayed on Wednesday. The second spraying should be made three days after the first, and subsequent applications at intervals of four days.

regular spray schedule is most important and must be adhered to in order to destroy the eggs and larvae from time to time in the leaf-blades, as when the larvae enter the leaf-stalks or the stems they are not affected by the spray. The neglect of even a day in the routine applications, may enable sufficient maggots to enter the stems and to cause serious injury. In most areas, sowings made in January and February and up to the middle of March, should be sprayed six or eight times, or until blossoming commences; sowings made during the latter half of March, at the approach of cool weather, require four to six applications; later plantings still, in April, usually require two to four sprayings.

Only the upper surfaces of the leaves should be sprayed, and 40 gallons of spray mixture is usually more than sufficient to

spray an acre once.

#### Red Spider.

The common red spider is a small mite, the adults of which are just large enough to be seen without a lens. It has a wide range of host plants and may cause serious injury to bean plants during dry weather.

These mites, which vary in colour from greenish-grey to brick-red, occur mainly on the undersides of the leaves, where they both feed and spin fine webs over the surface. The leaves become mottled in appearance, and where the infestation is severe, may turn yellow and fall prematurely. Most damage is caused during the months of January to April.

The mites thrive best in hot, dry weather, and their life-cycle, from egg to adult in summer, is about nine to eleven days. Many generations may occur during the year.

#### CONTROL.

Clean cultivation and the destruction of weeds, etc. which may harbour the pest, are important factors in preventing its spread. Red spiders may be observed crawling over the ground in the vicinity of heavily infested plants, and therefore any old infested and spent bean plants should be removed and burnt, to prevent the dispersion of the mites to adjacent uninfested crops.

A dust consisting of a mixture of fine sulphur (50 lb.) and hydrated lime (25 lb.) may be used to control the mites on bean plants. The hydrated lime is added to act as a "carrier" and to give an even distribution of the sulphur. About 50 lb. of sulphur (75 lb. mixed dust), applied with a duster, is sufficient to treat an acrc. A second application of dust should be given after an interval of a week. Control measures usually are only required during summer and early autumn.

#### Green Vegetable Bug.

Bean plants may become heavily infested with this bug, and although large numbers of the adult bugs may be present in a crop, they are not readily seen on account of their protective green colour.

Although all parts of the plants may be attacked, the most noticeable injury is

caused to the bean pods.

Young bean pods are the preferred food, and they become shrivelled and distorted as a result of bugs puncturing and sucking

the sap from them. Well-developed bean pods may become pale-coloured, dry and blotched in appearance.

The bugs overwinter as adults, and commence to lay their eggs about the middle of September. They increase in numbers and become most abundant during February and March.

#### CONTROL.

Collecting the adult bugs and their eggclusters on the leaves, early in the season, will help to reduce the amount of infestation later. Clean cultivation is an important factor in control, and as the bugs congregate amongst the leaves of old and spent plants, the destruction of these, together with the bugs thereon, helps to prevent increase and reinfestation.

No insecticide yet available will readily control the adults on the plants. The immature bugs may be dusted with pyrethrum powder mixed just before use with an equal quantity of 2½ per cent. nicotine dust.

In most districts this pest is now largely controlled by the introduced wasp parasite, *Microphanurus basalis*, the larvae of which develop within the eggs of the bug.

#### Thrips.

Thrips are small, delicate insects which feed by means of rasping or scraping away the surface of the plant cells and then sucking up the sap which exudes. They infest various weeds, etc., as well as cultivated plants, and feed mainly on the undersurfaces of the leaves. They also attack the flowering portions and very young pods of bean plants. The pods become curled and distorted owing to the injury they cause.

#### CONTROL.

The plants should be sprayed when three weeks old, and again before blossoming, with a foliage poison bait consisting of:—

Tartar emetic . . . 1 oz.

Sugar . . . . 4 ozs.

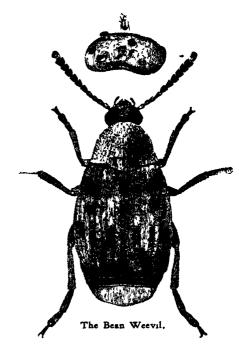
Water . . . . 4 gallons

This spray should be applied as a fine mist

and directed underneath the leaves.

#### Aphids or Plant-Lice.

In most seasons bean plants become heavily infested with aphids during the spring, and if the weather is dry they may cause serious damage. Aphids feed by puncturing the tissues and extracting the sap from the plants, and when abundant may cause the drying up and curling of the leaves. Bean plants may be attacked soon after they appear out of the ground. The undersides of the older leaves are usually infested, but all parts of the young growth may be covered.



The aphids most commonly found on beans are small, dark-brown or black species. The winged forms migrate to the plants tirst, and these give birth to living young which become wingless females.

Broad beans are very susceptible to aphid attack and the young growth, flower buds and forming pods may become stunted and deformed, while the leaves below may become spotted by the quantities of "honeydew" which the aphids excrete.

#### CONTROL.

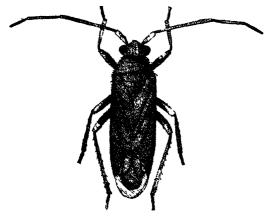
A nicotine and oil spray is recommended for the control of aphids on beans, the formula being as follows:—

Nicotine sulphate .. I fluid oz. White oil emulsion .. 6½ fluid oz. Water .. . . 4 gallons

More than one application of spray may be necessary. In some seasons aphids are kept in check by insect predators and parasites.

#### The Bean-seed Weevil.

Both the larvae and adults of this weevil attack bean seeds, either in the field or during storage. In the field the beetles lay their eggs on the pods. The grubs enter and feed inside the developing seeds, and soon after the crop is harvested the grubs



Adult of the Green Mirid Bug.

are ready to pupate or enter their chrysalis stage and develop into adult beetles. In storage the beetles lay their eggs amongst the seeds.

#### CONTROL.

Infested seed should be fumigated for 24 hours with carbon bisulphide, in an airtight container, using I fluid oz. to 16 cubic feet of air space. After fumigation the seed should be spread out to dispel the fumes.

The weevils may be controlled by dusting the seed thoroughly, with either copper oxychloride or kaolin, the quantity used being 1 lb. of either dust to 1 bushel (60 lb.) of seeds. Dusting with sodium fluosilicate and ceresan, at the rate of 2 oz. per bushel, has also been found effective.

Every seed must be coated with the dust. This will prevent the small larvae from cating their way into the seeds, but larvae already feeding within will continue to develop and later emerge as adults. The dusts, however (copper oxychloride and kaolin in particular), will prevent these adults from causing further infestation.

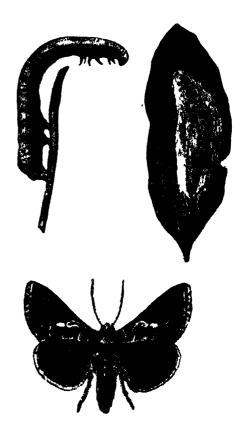
Clean seed may be protected from infestation by storing in stout muslin bags or in large tins which the weevils cannot enter.

'Flaked naphthalene, mixed through the seed (2 oz. per bushel) prevents heavy

infestation, and will protect lightly-infested seed from further damage. Naphthalene, if used following fumigation, may affect the germination.

Warning.—No lights of any description (pipes, cigarettes, fires or embers, radiators, stoves, etc.) must be allowed in or near sheds or buildings during the process of funigation with carbon bisulphide. The precaution should also be taken to cut off the electric current, and steam pipes should be allowed to cool before proceeding with funigation.

The copper compound, sodium, fluosilicate and ceresan, are poisonous.



Larva, Cocoon and Adult of a Pseudo-Looper.

#### Green Mirid Bug.

In some seasons a small green mirid bug, which measures a little more than one-sixth of an inch in length, attacks bean plants. The bugs attack the flower buds, and these become dry and later fall, thus causing a

considerable reduction of the crop. Injury of this kind is usually confined to the months of October and November, and is known popularly in the Gosford district as "blind eye." Bean pods attacked become misshapen.

#### CONTROL.

A kerosene emulsion incorporating pyrethrum has been used with excellent results. This emulsion is made by steeping 1 lb. of pyrethrum powder in 1 gallon of kerosene, and then making up the extract, after straining through muslin, in the manner usually practised for kerosene emulsion. This is accomplished by dissolving ½ lb. hard soap in 1 gallon of heated water and then stirring in and thoroughly emulsifying the kerosene-pyrethrum extract to form a stock solution. This 2 gallons of stock solution is diluted with water to make 40 gallons of spray.

A dust, consisting of pyrethrum powder I lb., mixed with tale 2 lb., has also given good results. Hydrated lime and sulphur dust, applied for the control of red spider, has been reported to repel the bugs.

#### Pseudo-Loopers.

Pseudo-loopers are allied to the cutworm moths, but their caterpillars remain upon the plants during the daytime. The fully-fed larva, which measures about 1½ inches in length, spins a thin, transparent silken cocoon on the foliage of the host plant on which it has developed. The adults may be recognised by the small silvery markings on their forewings. At times the caterpillars injure the leaves of bean plants, but have a wide range of food-plants.

#### CONTROL.

A cryolite spray, used at the rate of 1 lb. to 40 gallons of water, will control this pest on beans.

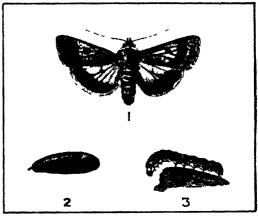
A dust, prepared by mixing pyrethrum I lb., and kaolin or tale 3 lb., will also control them. Arsenical dusts and sprays, if used on beans, may be responsible for foliage burn.

Beans should not be sprayed later than the flowering period, owing to the risk of undesirable spray residues, from later applications, remaining on the pods.

#### Tomato Moth.

This well-known pest of tomatoes has a wide range of host plants, and although present in most districts each year, only occasionally causes damage to bean plants.

The fully-fed larva, which measures about 1½ inches in length, is very variable in colour. It may be pale yellowish, green



1.—Tomato Moth.
2.—Pupa or Chrysalis.
3.—Caterpillar.

or even dark grey. The pupal stage is passed in the soil. Control measures are seldom required, but the methods recommended for pseudo-loopers may be adopted if necessary.

#### Bean Leaf-Hopper.

Leaf-hoppers are small, yellowish-green insects, which in some seasons migrate to beans from adjacent weed growth, or old bean plants. In their adult stage they are winged, and when disturbed both hop and fly for short distances. They are usually found beneath the leaves, where, in their adult and immature stages, they feed by sucking the sap from the plants.

#### CONTROL.

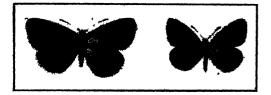
The contact spray recommended for aphids will control the hoppers, if three applications are made at weekly intervals.

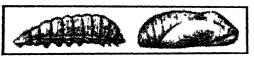
Bordeaux mixture (1:1:20) applied when the plants are three weeks old, and again a month later if necessary, will prevent them from breeding.

The sprays should be applied particularly to the undersurfaces of the leaves.

#### Bean Butterfly.

The larvae or caterpillars of this small "blue" butterfly sometimes cause damage to beans by eating the flowers, or chewing holes in the pods. They also feed on various other legumes.





The Butterfly

Top left.—Female. Top reght.—Malc. Bottom left.—Lava, or caterpillar. (Enlarged.) Bottom right.—Pupa, or chrysalis. (Eularged.)
[Lava and pupa after Waterhouse.

The green colouration of the small larvae renders them almost invisible in the crop, but the adults, which measure less than an inch across their expanded wings, may be seen flitting about in the sunlight over the plants. The upper surface of the wings of the female is dull blue-grey, with brighter iridescent blue near the body; in the male the wings are lilac blending into metallic brown.

#### CONTROL.

Dust the parts of the crop where the caterpillars occur with:—

A mixture of derris powder I lb. and kaolin or tale 8 lb.; or

Pyrethrum powder I lb. mixed with kaolin or tale 3 lb.

Spraying with a mixture consisting of:-

Derris powder .. .. 2 oz.
Soap .. .. 2 oz.
Water .. .. 4 gallons will also control them.

Hand picking of the larvae may be resorted to on small areas.

#### Bean Pod Borer.

This insect was recorded in this Gazette in 1939, as a pest of beans reaching the Sydney market from the north of New South Wales, but it does not appear to have been noted since then.



Moth of the Bean-pod Borer.

The damage is caused by the larvae, which tunnels into the bean pod and feeds on the seeds; the cavity becomes filled with excrement and the bean rots. The adult is a small moth which measures slightly more than an inch across the expanded wings.

#### A New Fruit-fly Proclamation.

THE Minister of Agriculture (Hon W. F. Dunn, M L A.) invites attention to the provisions of a new proclamation relating to the control of fruit flu

The use of glass fly traps with an ammoniasamlla lure is no longer prescribed. They may be used if growers desire, but only in addition to, and not in place of the foliage poison spray. The latter consists of 2 ounces of sodium fluosilicate or tartar emetic, 2½ lb of white sugar and 4 gallons of water. The area within which spraying is compulsory has been considerably extended, and now includes the greater part of the central and northern coastal districts.

Growers are now required to destroy waste and infected tomatoes in the same way as other fruit; that is by thorough boiling or burning or placing in an insect-proof pit.

Further information regarding the requirements may be obtained from the local fruit instructor or inspector, or from the Under Secretary, Department of Agriculture, Box 36A, G.P.O., Sydney.

Talking Will Not Win the War. It May Lose It.



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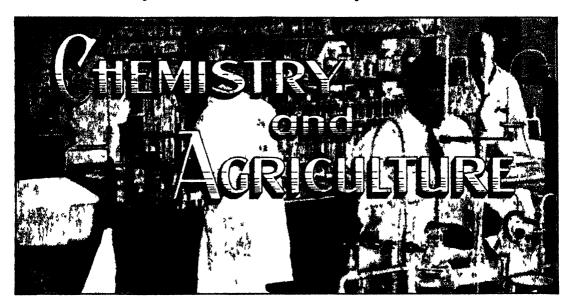
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## The Geologic Sources Of the Commoner Chemical Elements.

#### Their Agricultural Significance.

(Continued from page 347)

A N OLD, B Sc Agr Analyst

#### TITANIUM.

TITANIUM is comparatively little known, yet it occurs fairly abundantly, being the tenth most common element. It occurs, for example, in greater amount than the well known element carbon, which occupies eleventh place.

Compounds of the element are very widely distributed throughout almost all rock types, but concentrated deposits are scarce. This is probably the chief reason for the lateness of its discovery which was announced by Gregor in 1701—three years after the founding of Sydney. Gregor gave it the name menacanite, from Menacan, Cornwall, where he proved the presence of a new element in a mineral of the black sand. Klaproth independently discovered the element in a mineral from Hungary in 1794, and his name "titanium" has been adopted. The element does not occur in the free state in nature.

and although the impure metal was isolated in 1825 it is only recently (about 1910) that the reasonably pure metal has been obtained

litanium dioxide (1102) provides a good example of trimorphism, as it occurs as three distinct nuneral species-rutile, anatase, and brookite, all being identical in chemical composition, but differing in their crystal form and characters. Ilmenite, an oxide of titanium and iron (FeO TiO2) is the chief source of commercial titanium compounds. rutile being next in importance. Many deposits of iron ore, particularly magnetite, contain varying amounts of titanium, these are called titaniferous magnetites The silicate mineral, sphene (CaO TiO<sub>2</sub> SiO<sub>2</sub>) is the only other common titanium-bearing mineral, although dozers of rarer minerals contain the element.

India is the chief producer of titanium minerals, and Norway, Malaya, Canada, Senegal and Australia help to make up a total world production of approximately 300,000 tons annually.

Ilmenite and rutile are very resistant to weathering, hence their occurrence in sands in many parts of the world; from these most of the supply is derived. Such sands occur on the coast of several Australian States, and in New South Wales commercial operations have been carried on in the Byron Bay-Evans Head district. Associated minerals are zircon, monazite, tinstone, garnet and some quartz. It will be seen that these sands are quite different in character from ordinary siliceous sands.



Rutile Needles in Quartz.

[After Mellor.

Rutilated quartz, an interesting occurrence at Tingha, New South Wales, contains inclusions of needle-shaped rutile crystals, forming the so-called "grass-stones," which have some ornamental value—fine specimens are on display in the Australian Museum.

Ilmenite is common in the Prospect dolerite, forming large lustrous crystalline plates.

#### Titanium in Soils.

Titanium is frequently a constituent of clays and is almost universally present in soils. Most soils contain over 0.5 per cent., and some in Hawaii have been found to contain as much as 10 per cent. It has been shown to be present in coal ash, peat, anthracite, the Stassfurt salt deposits, some mineral waters, the ash of many plants and in animal bones and flesh; likewise in the sun, stars and meteorites.

Most of the titanium in soils appears to be of an inert nature, resembling silica. Small quantities only, find their way into plants. The element is not considered an essential one for plant and animal life. Recent research indicates some beneficial effect, when accompanied by boron and manganese, on the sugar beet.

An interesting property of metallic titanium is its power of burning with incandescence in an atmosphere of nitrogen at 800 deg. C., forming nitrides. Suggestions have been made that this reaction might be used in the synthesis of nitrogenous fertilizers.

#### Uses of Titanium.

Titanium alloys are largely used in steel' treatment, partly for the removal of nitrogen, etc., from the steel, partly as an actual constituent. Lesser quantities are required for electrodes and filaments in electrical As a colouring material the oxide has been used in paints, in pottery for producing ivory and cream colours, and in colouring artificial teeth. Titanium salts are used as dyes and mordants for wool, cotton, The chloride TiCl4 ispaper, and leather. used in warfare for smoke-screen production, and miscellaneous uses are for chemical work, some inks, pyrotechnics and glass. manufacture; some specimens of rutile are cut for gems.

(To be continued.)

# THE ENEMY LISTENS. Don't let the Fighting Services down by passing on secret information in your possession. GUARD YOUR TONGUE.



#### Systems of Orchard Irrigation.

C. G. SAVAGE, R.D.A., Chief Division of Horticulture.

FOUR systems of irrigation are in use in orchards in New South Wales. For three of them, viz., the furrow, the control flood or border, and the contour check systems, it is necessary to grade the land evenly in order to maintain a regular flow of water; irregular soil grades may cause local water-logging by restricting the flow. Where the spray system is used in the orchard, grading of the land is not so important, as the pipe lines through which the water runs are carried on overhead supports or laid out on the surface of the soil.

The furrow system can be successfully carried out on steeper grades than either the control flood or contour check methods. The ideal grade for furrow under most conditions is a fall of approximately 3 to 4 inches per chain, but at times the fall may be much greater, especially on hillsides, or on more or less flat country the grade may be considerably reduced. With the control flood or marginal, and the contour check systems, the maximum fall would be about 2½ inches per chain, but better results are obtained with approximately not more than 1¼ inches per chain.

The length of the furrow run in the case of the furrow and control flood systems will be influenced by the shape of the block, but mainly by the type of soil and the rate at which the soil will absorb water. Under most conditions the length of run would be about 5 chains, but in very light soils

the length should be reduced to 3 or 4 chains, while in heavy soils the run could be from 7 to 8 chains in length.

In the case of the contour check system, the size of the bay or check depends upon the soakage rate of the soil, and also the irrigation flow. The size of the bay is reduced on lighter soils and with smaller flows of water. On heavier soils with a slow soakage rate, bays containing forty trees might be used, whereas on sandy soils the bays should not contain more than ten trees.

#### Furrow System.

The advantage of the furrow system is that it can be used on moderately steep falls. Provision should be made for an adequate flow of water down the furrow, the flow being regulated to ensure an even wetting of the soil along the whole length of the furrow.

The number of furrows per row will depend upon the age of the tree, the spread of the root system and the distance apart that the trees are planted. With newly planted trees, one furrow on either side and close to the trees will suffice, but as the trees age and the root systems extend, more furrows will be necessary. Up to three on either side of the tree may be required. Streams of water are run down the furrows until the land at the lower end of the rows has been soaked sufficiently to water the root zone of the trees.

The disadvantage of the furrow system is that unless care is exercised the headlands may become over-saturated before the lower end of the rows have received sufficient moisture. It can be readily realised that such a method, unless carefully handled, will soon create a water-table in the soil at the top end of the row. Seepage may develop if the underlying impervious layer slopes in such a way as to cause the water to seep down until it reaches a rise in the impervious strata, or the strata peters out at the base of a slope.

To guard against the development of a water-table, irrigators at times fail to water the lower ends of the rows sufficiently, with the result that these trees sometimes suffer from lack of water before the next irrigagation can be applied. Care must therefore be exercised to regulate the flow of water so that an even soakage is obtained along the whole row of trees by the time the root zone at the bottom end of the row has received sufficient water.

#### Control Flood or Border System.

With this system a bank is formed on either side of the row of trees by the use of a "crowder." Water is then run down between the banks and under the trees. To carry out this system successfully, the grades of the land must be fairly uniform, with not more than about 21/2 inches fall to the chain. Streams of water must be fairly large in order to get a big volume of water on to the land in a short time. The object is to fill the area between the banks as quickly as possible, after which the streams may be reduced according to the soakage rate of water into the soil. The length of time necessary satisfactorily to water the root zone to a depth of 24 to 30 inches will have to be worked out for each type of soil.

The rate and depth of percolation can be ascertained by the use of the soil auger, by taking borings three or four days after an irrigation. From careful observations the irrigator will soon become expert in judging the amount of water to apply. Caution is necessary where this type of irrigation is used on light soils of quick absorption capacity, that a water-table is not created.

Danger of Salt Accumulation.—In many irrigation areas one of the dangers attending the application of water to the soil is the accumulation of injurious soluble salts within the root zone, unless adequate steps are taken to redistribute the salts or to leach them from the soil. Where natural outlets are available and the soil will respond to drainage, the installation of an underground system of tile drains will be advantageous, if the cost of installation is not excessive; underground drains will also be found desirable for the removal of seepage water.

It will be noticed that the greatest accumulation of salt takes place around the soaked area; therefore, the flood system of irrigagation where the water passes between the trees will tend to dissolve the injurious salts and carry them down to the subsoil and laterally beyond the root zone where they will cause but little damage.

#### The Contour Check System.

This system visualises the building up of contour banks throughout the orchard to form bays. The size of the bays will depend upon two factors, viz., type of soil and grade of the land. The lighter the soil and steeper the grades, the smaller the bays; bays will vary from ten to forty trees. Each bay should be filled from a ditch which may be permanent or temporary. One hay must not be filled from the overflow from another, as the soil of the first bay will become waterlogged, owing to the length of time the water remains in the bay, which will allow excess soakage of water into the subsoil.

The chief advantages of the contour check system are: (1) Provided proper precautions are taken, a ready control is obtained of the amount of water applied and the evenness of irrigation; (2) easier preparation of the land where cultivation is reduced; (3) the application of water is much simpler than with the furrow system, where the streams of water must be regulated from

time to time; with the contour check system large streams of water can be taken to fill each bay.

Where the contour banks are left more or less permanently, they may be the source of danger in wet winters by preventing the run off of surplus surface water. To pre-

it is sprayed evenly over the soil. It is certainly the most economical system, as the quantity applied can be regulated to a nicety. The distribution is even, consequently water-logged conditions can be avoided if care is exercised in the application of the water. By wetting the whole of



Overhead Spray Irrigation, Perricoota, River Murray.

vent this, it is advisable to plough large drainage furrows down the steepest fall of the land to carry away the excess water.

#### The Overhead Spray System.

By this method the water is applied to the land by a series of pipes, from which the surface of the soil the accumulation of injurious salts in defined areas is prevented.

The greatest drawbacks to this system are the cost of installation and that pressure is necessary to force the water through the pipes.

#### The Custard Apple.

(Continued from page 476.)

H. W. EASTWOOD, H.D.A., Special Fruit Instructor.

IN October issue Mr. Eastwood described the influence of climate and time of fruit setting on the quality of the cherimoya custard apple. The soil and cultural methods (including pruning) suitable for this sub-tropical fruit are given in this portion of the article, and a concluding section will deal with packing and marketing.

This tree can be grown in a wide range of soil types from sandy loams to moderately heavy clays, provided drainage is good.

A sheltered position facing north-east tonorth is preferable. Custard apples grow well in the red basaltic soils, but like most other sub-tropical fruit trees they do best when grown in a deep, rich, mediumtextured loamy soil which is moderately moist and well supplied with organic matter. In badly drained soils the growth is spindly and weak, leaves drop prematurely and the remaining foliage is anythingbut a healthy green colour. If the roots are flooded for a prolonged period, as would be the case in waterlogged soils, the tree will die. Lack of drainage is more often responsible for unhealthy trees than any other cause. On the contrary shallow soils, or those which will not retain moisture, deprive the trees of necessary water and plant foods; under these conditions early decline of the trees can be expected. Good drainage, friability and fertility are essential soil conditions for successful culture.

#### Propagation Methods.

Trees are raised from seeds which are sown in the spring ¾ inch deep in seed beds in a prepared nursery soil (such as 2 to 1 leaf mould and sand) or a sandy loam. With the usual care bestowed on raising seedlings, there should not be any difficulty in obtaining a good germination in about four weeks in warm weather. The seedling trees are transplanted when about a year old, being set out 18 inches apart in nursery rows 3 feet apart.

As seedling trees are unreliable and do not always produce good fruit, it is advisable to work them to the best varieties. The seedlings can be budded during the ensuing summer (February and March), and any failures can be budded the following spring (October and November). Grafting is also performed in the spring and is preferred to either shield or patch budding.

Stocks 3/8 to 1/2 inch in diameter are of suitable size for working. If budding, use large buds about 11/2 inches long, from well matured wood, grey in colour; small buds callous over too rapidly. In about three weeks time it will be known if the buds have taken, and, if so, the stocks should be cut back to 6 inches above the buds. The ties should also be loosened, but they should be retied, leaving the bud exposed, otherwise the flaps of the bark may curl back and die, in which case some of the buds will be destroyed. The final cutting back of the stock is made when the buds have grown into sturdy shoots.

In grafting nursery stocks, the whip and tongue method is generally used, but side tongue grafts are also suitable. Use scions from 1-year-old wood that has not burst into bud, and they should be a suitable size to match well-grown, year-old stocks.

Older trees can be top worked by cleft or bark grafting. Side grafting may be performed when it is desired to retain the head of the tree until the grafts have grown. All scion wood, either for budding or grafting, should be selected from the most productive branches of the most desirable trees.

The Cherimoya is as good as any other species of Annonaceae for stock purposes, but the seeds for stock production should come from fruits of the most vigorous trees to guard against disparity in growth as a result of working a robust grower on a weaker one.

The most popular variety is Pink's Mammoth or Pink's Prolific, though the Island variety is also grown.

#### Planting the Trees.

Prepare the land for custard apple trees in a similar manner as for other orchard trees by ploughing deeply and thoroughly prior to planting. Transplant the trees to the field during spring, but while they are still dormant, at a distance of 28 to 30 feet apart on the square. Although closer planting would, no doubt, produce a higher humidity more favourable to fruit setting, it is not advisable, as this tree is of a spreading nature and requires a lot of room to develop. The foliage would meet after some years if the trees were planted closer than 25 feet apart under favourable conditions. Local environments and soil conditions should be taken into consideration when deciding planting distances. In Queensland Williams\* recommends at least 30 feet spacings, and up to 40 feet apart is not excessive.

Holes should be dug large and deep enough to accommodate the trees comfortably. The top soil should be kept separate from the underlying soil and used for placing around the roots of the trees and filling in the holes. Pack the soil firmly around the trees. The trees, which are about 2 years old when transplanted, should be set a little higher than in the nursery to allow for soil sagging.

It is advisable to give each tree a bucket of water when setting out in field, and to mulch them afterwards. Failures are rare in transplanting if ordinary care is exercised. Trees should be watered and mulched from time to time as may be necessary.

<sup>\*</sup>WILLIAMS, G.—Custard Apple (Annona cherimola.) Queensland Agr. Jnl., Feb., 1927.

#### Cultivation.

Subsequent cultivation consists of deep ploughing during winter or early spring while the trees are young, but as they grow and develop, it is necessary to reduce the depth of cultivation, otherwise part of the root system will be destroyed. The custard apple tree is not a deep rooter, but the roots will extend further and deeper in friable and fertile soils than in other types. Keep the ground under the trees free of weeds by hoeing periodically.

Planting cover crops, leguminous for preference, or allowing volunteer weeds to grow between the rows, when soil moisture is plentiful in summertime is also beneficial. These should be ploughed under at the right time. Cover crops do much better while the trees are small, but in older plantings there is usually too much shade and insufficient room between the trees to grow these crops successfully.

The primary purpose of cultivation is the control of weed growth which would otherwise compete with the trees for moisture and minerals. During the spring or other dry periods clean cultivation should be practised, and weed growth destroyed by cultivators, weedicides or hand implements to ensure that the trees receive the maximum amount of available soil moisture. A method of soil management that will conserve moisture, add organic matter and thus increase

fertility should be planned and practised. In general the cultural requirements are similar to citrus.

#### Pruning the Custard Apple.

Custard apple trees are deciduous and remain bare of leaves for some weeks during the spring when other trees are making vigorous growth. The fruiting habit, also, is different to that of other deciduous fruit trees; custard apples bear on the current year's growth as well as on older wood. I'runing of these trees should not be performed until the sap is commencing to rise, at the end of the dormant period, and the movement is noticeable in the buds. Neglect to observe this rule will frequently result in damage to and sometimes death of the tree.

After planting, young trees should be topped 24 to 30 inches from ground level, leaving either a whipstick or single fork formed by two laterals. The laterals, which should branch from the stem a few inches apart, are shortened 3 to 6 inches, depending on their vigour. Shoots produced during the next growing season should be thinned out so that the remaining ones selected to form the framework of the trees will be more suitable for their purpose.

When next pruned two, or may be three, of the strongest leaders on each limb in the best positions are selected and reduced to 12 to 15 inches. All other growth is cut





away. Prune the trees similarly the following season by duplicating and shortening the branches, but not as severely as before. Some laterals can be left, but are cut back to ensure rigidity. Subdivision of branches can also be obtained by retaining well placed, vigorous lateral growths.

Any required number of leaders can be selected in subsequent years, but they are not shortened to the same extent as previously. Laterals are also encouraged; some of them are cut back reasonably, while others are left untopped but thinned out to prevent overlapping and over-crowding.

Forming the head of the tree reasonably high in the beginning allows for the bottom branches to sag later on, which is the natural



Custard Apple Tree Breaking into New Leaf, and Blossoms, after Dormant Period.

habit of the Cherimoya. These branches should be at least 2 feet from the ground at the junction with the trunk, and the outside edges of the foliage should be skirted free of the ground. If allowed to grow unchecked, the distal half or so of the lower limbs will rest on the ground, and if they are removed, the next in succession usually droop to take their places.

This tree has a pendulous and straggling habit, and is inclined to overcrowd in the centre, thus reducing the entry of light and air which retards good wood formation throughout the inside of the tree. The centres should, therefore, be thinned out properly, leaving strong and well matured year-old and older laterals, which are shortened, if necessary, to the desired length. All dead, diseased and spindly wood should be removed.

Once the tree is formed no serious attempt should be made to change its natural form by severe pruning, since such a practice will cause reduction in tree size and yield of fruit.

Pruning is thus severe for three or four years, to encourage branching of limbs and to develop a sturdy and well-shaped framework. After this period heavy pruning is not justified; in fact, it is detrimental, except when old or weak trees are cut back severely to rejuvenate them. Such drastic treatment should be accompanied by adequate feeding of the trees to force out ample new vigorous The limbs or branches cut back shoots. should be protected against sunburn by whitewashing or shading and the cut surfaces painted or waxed over. After the framework of the tree is developed, light pruning is adopted.

#### Fertilisers.

The kind and quantities of fertilisers for custard apple trees is still largely a matter of conjecutre. Williams\* states, "()n no account should the soil in the vicinity of young trees be fertilised at the time of or shortly preceding planting. The young roots are very sensitive and the action following contact with fertiliser has been responsible for many of the failures recorded in transplanting."

Trees respond in growth and vigour to the application of nitrogenous fertilisers, and 3 to 4 lb. of this plant food per bearing tree per year would not be excessive. A mixture of sulphate of ammonia, 5 cwt., superphosphate, 3 cwt., and sulphate of potash. 2 cwt., used at the rate of 1 lb. for each year of the trees age, up to twelve years, gave promising results for two seasons at Grafton Experiment Farm Orchard. The quality and size of the fruit was improved and better yields were obtained. This mixture was distributed over the land about four weeks prior to blossoming and harrowed or chipped into the soil.

(To be continued.)

<sup>\*</sup>WILLIAMS, G.—Custard Apple (Annona cheri-mola). Queensland Agr Jnl., Feb., 1927.



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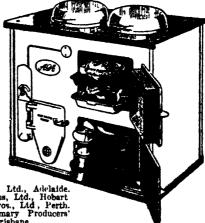


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#### SEASONAL PROSPECTS.

FROM a survey of the honey-flow prospects it is anticipated that the heaviest production will be secured in the southern and western inland divisions of the State, particularly in the river country, where Yellow Box (Eucalytpus melliodora) and River Red Gum (E. rostrata) are well distributed. The bud prospect on the latter species, which usually flowers during late December and January, is very attractive. It is quite likely too, in view of the seasonal conditions, that useful production will be secured from ground flora sources such as St. Barnaby's thistle and lucerne within fairly close range of the inland rivers country. It is rather early to obtain any useful guide concerning the bud prospect of the useful Stringybark and Bloodwood species for autumn production.

The bee-farmer is given every inducement, this season, to produce as much honey as possible; the market is lightly supplied, prices are satisfactory, and there is an increased demand from military and ordinary trade sources. During the productive season he will be faced, of course, with some problems arising from the shortage of experienced labour, limitation of migratory work due to petrol rationing and difficulty in securing adequate supplies of hive material. However, a good deal may be done to relieve the position by careful planning and by the application of good management in the apiary and honey room.

#### Timely Extraction May Avoid Substantial Loss.

Owing to the failure of many bee-farmers to organise their work so as to be prepared for the timely extraction of honey, a fairly heavy loss in production occurs during every season. The combs become filled with honey, and as the bees cannot continue their

productive work, a very substantial loss, even up to as much as £50 in an apiary of 100 colonies, may be incurred in one week by such a hold-up. In addition, where masses of burr-comb have to be contended with, the removal of combs from the overfilled hives is a very difficult proposition. Very often, also, the future welfare of the colonies is affected by honey being forced into the brood nest, where it interferes with the all-important brood-rearing service.

After inspection of the apiaries during a honey flow, it is necessary to decide on the order in which each apiary shall be placed for extracting work, and then to add to the hives in the out-apairies all available supers—to keep the colonies awaiting their turn for extraction, busily employed in production. A study of the needs of individual colonies will serve a useful purpose, for in all cases some stocks are more progressive in honey storage than others, and these require additional accommodation. There may be

instances, too, where supers of combs from non-progressive colonies may be more economically employed on other hives.

#### It is Unwise to Extract Unripe Honey.

Where a bee-farmer is faced with the possibility of loss in production under the circumstances described, and has not prepared an ample supply of hive material to contend with it, there is a temptation to risk extraction of honey before it is properly ripened by the bees. This is a very undesirable practice, and may result in the production of a weak-bodied, inferior product liable to fermentation because of its high moisture content. To be on the sure side wait until a large proportion of the sur-



Fig. 1.—A Handy Apiary Iruck in Ose a: Hawkesbury Agricultural College.

face of each comb of honey is capped before extraction. The capping-over of the cells of honey is the only definite guide to the bee-farmer that the bees have completed their processing work.

#### The Time for Extraction.

One of the questions commonly asked by the beginner is "When should I extract honey from the hives?" The answer is that there is no set time for extracting, since there is variation in the occurrence of honey flows which will allow the bees to fill their hives. Some species of plants flower every year, others every second year, and climatic

conditions may affect production. It is possible to determine when a honey-flow is occurring by observing the flight of the field bees coming into the hive; they have a fullness about them which is not present at other times, their flight is steadier, and some of the heavier laden bees misjudge their distance and alight on the ground near the hive entrance. We find, also, that a distinct aroma may be detected, arising from the processing of the new honey within the hive. The only sure guide to the progress in storage work, and as to whether the honey is sufficiently processed by the bees for extraction, is by regular inspections inside the hive during the active working season.

A rather heavy loss in production may ccur in the beginner's apiary through lack of confidence in determining whether honey hould be extracted from the hives, or left vith the bees to prevent risk of them runing short of stores later on. The anxiety nay be relieved by the adoption of the simple olan whereby half of the hives are extracted whilst the remainder are left with ample supplies. Later on, when it is observed that good headway in storage has been made in he extracted hives, the others may be reheved of their surplus. To keep the bees in the hives awaiting their turn for extraction fully employed, an additional super or two may be given them.

Where only one hive is kept it should be built up with not less than two honeystorage supers, and this will enable the young bee-farmer to extract from one super at a time, thus giving the assurance that there will be no loss in production, and the colony will have a good reserve of stores to provide against any future adverse seasonal condition. A little additional caution in the matter of reserving stores is necessary coming on toward winter months, and where it is observed that the bees are inclined toward robbing during manipulation of the hives.

#### A Handy Apiary Truck.

Owing to the difficulty of securing assistance for apiary work this season, any labour-saving device which can be employed will surely prove a valuable asset. A very useful hand truck to save heavy lifting is described by Benj. Nielsson in the July,

1939, issue of Gleanings in Bee Culture, from which the description given below is taken. A similar type truck is used with success at the Hawkesbury Agricultural College, Richmond, and by Mr. R Whiting at his extensive apiaries in the Molong district.

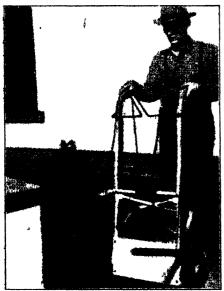


Fig 2 —The Grasping Arms of Medium Heavy Strap Iron are Raised and Lowered by Means of U-shaped Iron Rod Handles

"In making this handy truck, two cultivator handles, two rubber-tyred 10-inch coaster air tyres, and some iron and wood for framework are needed. The framework is made just wide enough to take the widest hives. The legs are bolted on and braced Holes are bored in the handles, 3 inches from the lower end and the axle is inserted. The grasping arms as shown in the accompanying illustrations, are of heavy strap iron, measuring 20½ inches from bend at the ends to the truck bed.

"The adjustable feature, which adapts the truck for use with varying sizes of hives, consist of a half-inch iron rod, which extends through the handles, 4 mches above the axle, and two bevelled pieces of iron (Fig. 3). The holes through which the rod extends should be slightly over-size to permit free movement. Have a blacksmith thread both ends of the rod, and bevel two 2-inch squares of iron, drilling a hole through the centres and cutting the threads

to screw on to the rod. The threads should be cut just far enough to allow the bevels to be screwed tightly on the rod, but the bevelled pieces should not fit tightly against the frame. Over-sized holes should be drilled through the ends of the grasping arms, which are slipped on this rod, next to the bevels and held in place by nuts. The bevels and iron rod are moved as one, by the iron rod arm, which extends upward within easy reach of the operator.

"The grasping arms are raised and lowered by means of the U-shaped iron rod handle (Fig. 2). Raised by a forward movement of the handle, the grasping arms remain due up, the ordinary door spring, which is fastened to the top end of the iron handle. The opposite end of this spring is fastened to the cross-brace of the legs at the proper tension to hold the arms up. As the arms are lowered, the bevel pieces cause the outer ends of the arms to swing in, the bends hooking over the front end of the hives.

"For wide hives the iron rod in the centre (Fig 2) is pushed forward, and back for narrow ones."

(Continued on page 535.)



Fig. 3.—The Adjustable Feature Consists of a 1-inch Rod and a Bevelled 2-inch Iron Square, Screwed on Each End of the Rod.

#### COLD STORAGE OF ONION SEED

#### To Prevent Deterioration.

AMY MYERS, Seeds Officer.

THE most damaging factor in seed storage is moisture—both that contained in the seed and that held in the atmosphere—when storage is affected by the varying temperature and humidity of "natural" conditions. After extensive research, J. M. Beattie and V. R. Boswell of the United States Department of Agriculture in 1939 made a general recommendation\* that in localities of high humidity, high temperature or both, onion seed be held in cold storage.

Investigation of the viability of locally grown onion seed as related to storage was begun in the seed laboratory two years ago, the variety, Hunter River White, grown by Mr. S. Redgrove, of Branxton, being selected for the test. The seed was harvested in 1940, and the original tests resulted in 93 per cent. germination.

The sample was divided into four portions for storage, two being put into small canvas bags for unsealed storage, and two counted into equal lots that were put separately into small corked phials, sufficient seeds being put in each phial for one test, so that sealing remained intact until each testing period occurred. One sealed and one unsealed portion were then put into a refrigerator and maintained at 5-10 deg. C. (40-50 deg. Fahr.). The remainder were stored at room temperatures.

Tests were made at quarterly intervals, but the annual and biennial results given below are sufficient to show the effects of time and storage conditions.

\* United States Department of Agriculture, Circular 512

	"Natural" conditions.		"(old Store." [(Refrigerator at 40-50 deg. Fahr.)	
	Unscaled.	Sealed.	Unscaled	Sealed.
One year old	83	93	93	92
Two years old	27	75	90	84

Though the work is not complete, results to date are conclusive in showing:—

- I. Good quality seed of this variety held in unsealed storage under "natural" Sydney conditions, will not maintain its high germination capacity for more than one year.
- 2. Sealed storage under "natural" conditions is better than unsealed.
- 3. Cold storage, whether sealed or unsealed, prevents deterioration for at least two years.
- 4. After about six months' storage, germination is consistently quickest in the unsealed cold storage lots.

At the suggestion of Mr. Phillip Yates, of Arthur Yates and Co. Pty. Ltd., seed merchants of Sydney, who pointed out that in commerce some time would lapse before seed taken from cold storage would be sown in the field, samples were taken from the refrigerator and stored in the room for three months before being tested. Results so far indicate that the unsealed lots deteriorate rapidly, but that the sealed lots germinate as well after three months in "natural" conditions, as do those in cold storage.

#### WAR GOSSIP IS DANGEROUS.

Enemy agents are vitally interested in Australia's War Effort.

Don't assist them by discussing what you!know about the manufacture and storage of munitions.



Two American divisions of General Motors— Pontiac and Fisher Body—have now been awarded the U.S. Naval Ordnance Flag and the Navy "E" pennant for outstanding efficiency in the production of Naval material.

At the presentation ceremony to Pontiac, Rear Admiral Downes, U.S. Navy, said: "No one who knows the Navy need be told what it means to earn the 'E'. On a Naval vessel it tells the world she is a smart ship — a champion. Of all the firms engaged in war production only a few have attained the degree of excellence meriting the Navy 'E' Award'.

In the Australian factories of General Motors-Holden's, as in the many G.M. plants in Britain, America, Canada, and elsewhere, thousands of men and women are vigorously applying their peace-time skill in mass production to the manufacture of vital war materials.

The results achieved are tributes to the standard of National Service rendered by the men and women who have done the job.

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## HANDLING THE WHEAT CROP.

#### A Serious Railway Problem.

IT is officially announced that the New South Wales wheat crop will amount to 48,000,000 bushels.

That quantity will be much below many crops harvested in the past, but in all probability it is a conservative estimate, especially in view of the welcome rains which have fallen over most of the wheat areas of the State during the last two months.

But the handling of a crop of even 48,000,000 bushels of wheat presents a problem of considerable magnitude to the Railway Department.

No other means of transport than by rail is available to bring wheat to the seaboard area, or, with few exceptions, to the various mills throughout the State.

This month the message of the Railway Department to readers of the "Agricultural Gazette" is: Join Hands. Co-operate so that the best service may be given when the call comes to handle the wheat crop.

When ordered, trucks must be loaded promptly and discharged with all speed. Otherwise satisfactory rail transport service will be impossible.

S. R. NICHOLAS,
Acting Secretary for Railways.

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DEPARTMENT OF AGRICULTURE,
New South Wales.

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Government Entomologist. Royal 8vo.
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#### POULTRY NOTES.

November, 1942.

#### Christmas Table Poultry.

E. HADLINGTON, Poultry Expert.

THERE is every indication that the market for table poultry this Christmas will be the best for many years, and those who have the accommodation to enable them to hold cockerels hatched before the middle of August, should show a good profit on well-reared birds. It might be just as profitable, however, to sell cockerels hatched during June or early July during this month, but this can only be determined by watching the market and being guided by the prices ruling.

The cost of feeding has, of course, to be taken into consideration, but this is not as high as many poultry farmers imagine. The particulars given hereunder, based on present prices of foodstuffs, will be helpful in deciding whether to hold the birds for the Christmas trade or sell them as they reach a suitable market age.

Cost per Bird for each 4 Weeks.

•	•	•
1st 4 weeks		34d. per bird.
2nd 4 weeks		2d. per bird.
3rd 4 weeks		4d. per bird.
4th 4 weeks		4, 2d. per bird.
5th 4 weeks		5d. per bird.
6th 4 weeks		6d. per bird.
7th 4 weeks		7d. per bird.

Total for 28 weeks 2s. 51/4d.

Those who have the facilities for "topping off" market cockerels can improve their quality and obtain better prices by penning them up for about three weeks and feedings them on a fattening ration.

Suitable mashes for this purpose can bemade up as follows:—

I.	Fine wheatmeal Pollard Maizemeal Bran	30 lb. 30 lb. 10 lb. 30 lb.
		100 lb.
	Salt	22 07
2.	Wheatmeal	40 lb.
	Pollard	20 lb.
	Maizemeal	5 lb.
	Ground oats	rolb.
	Bran	25 lb.
		100 lb.
	Salt	22 Oz.

These mashes should be mixed with skinn milk, preferably to a sloppy consistency.

and should be given morning and afternoon, allowing as much as the birds will consume within about an hour of feeding. In the absence of fresh skim milk, any dried milk product obtainable, mixed with water at the rate of 5 to 7 per cent., will be beneficial, or 10 per cent. of semi-solid buttermilk would be a good substitute.

When first confined the birds often will not eat as much as they should, and in such cases lose weight during the first week; it is, therefore, a good practice to give only about half as much food as the birds should normally receive for the first day, so that they will be keen for food. A dose of epsom salts given in the drinking water during the first day, at the rate of one ounce to a gallon, will also help to increase their appetites.

Only healthy, well-grown birds are fit subjects to fatten—it is waste of time to attempt the fattening of unthrifty birds.

## Approval to Erect Buildings.

It is apparently not generally known that anyone wishing to erect buildings or fences, involving an expenditure of over £25 for materials and labour, must first obtain the approval of the Deputy-Director, Department of War Organisation of Industry, 18 Martin-place, Sydney, and that unless such authority is obtained, the local council will not approve of any plans for the erection of buildings, etc.

In order to save delay in having applications dealt with, it is necessary to submit



Prime Australorp Cockerels.

Only a limited amount of green feed should be given, and this should be of a succulent nature.

A supply of hard grit, such as gravel, is an advantage during the time the birds are confined, if they are kept in coops or pens off the ground.

After the birds have been in the pens for about two weeks, it is advisable to keep them under close observation in order to detect whether any are showing signs of losing condition, in which case it is necessary to market these particular birds at once, as they will not recover in confinement.

the undermentioned particulars concerning the proposed work:—

- 1. Reason for wanting to build.
- 2. Location of premises.
- 3. Proposed materials—brick, fibrocement, etc.
- 4. List of materials already on site, and value.
- 5. Whether new building, renovations or alterations.
  - 6. Estimated cost.

In the case of bona-fide poultry farmers, there is little difficulty in obtaining the necessary approval, provided that full particulars are supplied. Where any doubt exists as to the necessity for the work to be carried out, the Department of Agriculture is consulted.

# Wire Netting and Fencing Wire Supplies.

OWING to the demand for wire and steel for war purposes, the Directorate of Materials Supply has restricted the quantity of fencing wire and wire netting available to the different industries, and supplies will only be released through firms handling these materials, on the authority of the Deputy Controller of Materials Supply, of Munitions, Shell Ministry Carrington-street, Sydney.

Arrangements have been made with the Department of Agriculture to handle applications for wire and wire netting, in order to advise the Controller as to the essentiality of requirements. The procedure to be followed is that the producer should submit his application to the Under-Secretary. Department of Agriculture, stating the quantity of each class of wire or wire netting required, and the purpose for which it is to be used. Poultry farmers should give particulars of the numbers of layers kept and the size of runs to be erected. The name of the firm from which supplies are to be obtained should also be given, so that the Controller can authorise the supply of the material. Wire, etc., will not be made available to firms to supply to unspecified producers-it is necessary for each individual to apply for supplies required.

Only black wire and wire netting will be available, and the sizes are restricted to 72inch x 2-inch x 17-gauge and 48-inch x 1inch x 17-gauge wire netting for poultry farmers, and mainly 121/2 gauge barbed wire and fencing wire. The latter being high tensile wire, is said to be equal in strength to No. 8 wire.

A monthly quota of wire and wire netting is to be released for the poultry industry, and farmers are requested to limit their applications to actual current requirements, so that supplies can be equitably dis-Any attempt to hoard these materials may lead to refusal to release supplies in such cases.

## Oualified Chick Sexers.

DURING this season only one chick sexing examination was held, which resulted in one candidate qualifying for a Special Class Certificate.

The following is a complete list of those who have now qualified for Special and First Class Certificates at examinations held by the Department of Agriculture. Many of those who have qualified for the Special Class Certificate are equal to the most expert sexers in the world.

### Special Class Certificate.

F. D. Evans, Leanington-street, Dundas. S. W. Leach, Windsor-road, Baulkham Hills.

A. L. B. Newton, 6 Gordon-street, Blacktown.

N. V. Davies, Garnet-road, Miranda.

(). Johnson, Park-road, Baulkham Hills. R. W. Druce, Old Prospect road, Wentworthville.

R. A. Percival, 135 Longueville-road, Lane Cove.

S. Martin, Duggan Farms, Blacktown. Mrs. O. Johnson (Miss P. Jarman), Murray Farm road, Carlingford.

S. G. Olsson, 104 Wigram-street, Harris

Miss B. B. Brown, Redleaf, Green'savenue. Dundas.

### First-class Certificate.

A. A. Tegel, Leppington.

R. Badman, Mackenzie-street, Revesby.

J. R. Kilborn, 9 Denman-street, Eastwood.

E. Marchant, Melbourne, Victoria.

W. Evans, Leamington-street, Dundas. Mrs. F. D. Evans (Miss Mavis Heath), Learnington-street, Dundas.

C. C. Green, 82 Carlingford-road, Epping.

Miss V. Wilson, Box 249, P.O., Newcastle.

11. Jacobs, Vimiera-road, Eastwood.

I. Λ. Hazlett, Ingleburn.

Mrs. A. Brakell (Miss D. Ranch),

Church-street, Carlingford.

K. Gibson, Wensley House, Stamford Park road, Mt. Roskill, Auckland, New

C. R. Sims, Fairfield-road, Guildford.

1. Edwards, Bungaree-road, Toongabbie.

First-class Certificate—continued.

Gordon Thomson, Opoho, Dunedin, New Zealand.

A. E. Sutton, 65 Bungaree-road, Wentworthville.

J. H. Turner, Hotham-road, Sutherland. Mrs. T. M. Brown, Main-road, Kearsley, via Cessnock.

J. Herrman, 86 Station-street, Fairfield. H. Wallaste, Grantham-road, Plumpton. O. Van Stappen, Pacific Highway,

Wyong.

### Standards for Special and First-class Certificates.

The standards now laid down in the examinations are:—

For a Special Class Certificate it is necessary to sex 300 White Leghorn chicks in 45 minutes with 98 per cent. accuracy, without killing or injuring a chicken.

For a First-class Certificate it is necessary to sex 200 White Leghorn chickens in 30 minutes with an accuracy of 95 per cent., without killing or injuring a chicken.

Numbers of inquiries regarding chick sexing are received by the Department from time to time. For the information of those who contemplate taking up this work, it is pointed out that it is necessary to have good eyesight and deft fingers. Some instruction is essential, and intensive practice over at least a few months is usually required to reach the standard necessary to obtain a certificate. This involves having available some thousands of chickens for practising upon.

It should be realised that, while qualified sexers can earn a good income during the hatching season, the period over which they are employed is comparatively short, extending from about May to October; only a few are engaged at any other time of the year. However, owing to the widespread adoption of sexing, and the fact that some qualified operators have recently ceased to practice, there are good prospects for those who are prepared to devote the time and incur the expense necessary to qualify for certificates.

# Selected Citrus Buds.

# The Co-operative Bud Selection Society, Ltd.

For some years it has been recognised that in most citrus groves there are trees that rarely produce sufficient fruits to be payable, whilst other trees are more constant producers of good quality and payable crops, so that with a view to enabling nurserymen to supply trees of the most productive and remunerative standards to planters, the above Society was formed under the aegis of the Department of Agriculture, and consists of representative fruitgrowers and nurserymen. The Society does not and cannot make profits, but merely exists to improve the fruit-growing industry by making available for budding selected buds from special trees of the best type of quality fruit and of reputed good bearing habit only. Trees from such buds should undoubtedly be more profitable and appeal to all progressive orchardists.

The Co-operative Bud Selection Society Ltd. supplied the following selected buds to nurserymen during the 1941 budding season, trees from which should be available for planting during the 1942 season:—

	Washing- ton Navel.	Valencia Late.	Marsh Grapefruit.	Eureka Lemon.	Lisbon Lemon,	Emperor Mandarin.	Total.
Adamson, T., Ermington Cambourn, H., Gosford	4,000 3,500	4,000 5,000		2,000 3,000	•••	•••	10,000
Catt, F. D., Carlingford	3,000	3,000		3,000	1,000	•••	10,000
Eyles, A. T., Rydalmere	5,000	5,000	1,000	2,000	•••		13,000
Ferguson, E. H., Wyong	1,000	1,500		500	•••		3,000
Ferguson, F., & Son, Hurstville	2,500	2,500					5,000
McKee, Geo., Rydalmere Rosen, L. P., & Son, Carling-	1,500	1,000	•••	1,000	1,000		4,500
ford	10,000	15,000	2,000	5,000	1,000	800	33,800
Smith, W., Rydalmere Spurway, F. E., & Son,	•••	•••	•••	2,000	•••	•••	2,000
Ermington	3,500	5,000	750	500	250		10,000
Swane Bros., Ermington	5,000	2,000	1,000	1,000	1,000	800	10,800
	39,000	44,000	4,750	20,000	4,250	1,600	113,600

# PARAGRAPHS AND NOTICES.

### Cold Storage of Grapes Experiments.

WITH the object, mainly, of confirming the results obtained last year with the use of meta bisulphite, and also of arriving at the minimum suitable quantity of sodium bisulphite, for use in the prevention of mould formation and other causes of deterioration of grapes in cold storage, experiments were again carried out this year. The manager of Darks Cold Stores, Newcastle, kindly made space available in two rooms; in one certain grapes were stored at about 31 deg. Fah. (called for convenience "low" temperature), and in the other at 35 to 36 deg. Fah. (called "high" temperature). The Baumé tests of the Ohanez grapes on picking were from 10 to 101/2 degrees.

The grapes were placed in the cold stores on 25th April. Half-bushel cases were used, containing 21 lb. of fruit and 2¼ lb. of cork.

Cases of Ohanez were stored at "low" and

"high" temperatures as follows:-

No treatment; 7 grammes meta bisulphite mixed with the cork; 21 grammes sodium bisulphite mixed with the cork; 14 grammes sodium bisulphite; 7 grammes sodium bissulphite; 20 grammes

flowers of sulphur mixed with the cork.

Cases of Black Malaga and Emperor in which 10 grammes of meta bisulphite were mixed with the cork were also stored at "low" temperature

and compared with untreated cases.
On 1st July, the Black Malaga and Emperor cases were examined, and though the untreated Black Malaga case showed a little mould on the ends of a few stalks, the fruit in the treated case was in good condition and the stalks were free of mould. Odd berries in the treated Emperor case were affected with mould, but the untreated Emperor case had to be thrown out, since half of the berries had broken down and the stalks were mouldy.

On 30th July, or fourteen weeks after the grapes were first placed in the cold stores, an inspection of all grapes was made. The conclusion arrived at was that the use of both meta bisulphite and sodium bisulphite was a distinct advantage in preventing mould growth. The sodium bisulphite appeared to keep the stalks in better condition as regards colour than the meta bisulphite. The doses of meta bisulphite could be increased with advantage; it is suggested that 10 to 12 grammes per half case be used.

"Low" temperature appears to be better than 'high" temperature for grapes, and if it is possible to get storage at "low" temperature 29 deg. Fah, is suggested.

The grapes were held over for further inspection on 11th September, but it was found that this lengthy period was too long for satisfactory cold storage. The berries were gone off badly in some instances, and had browned off in others. The meta and sodium bisulphite treated cases were still more or less free from mould; particularly was this so in the sodium bisulphite lots.

In working out the dosage figure applicable to export size cases, it would be necessary to increase the amounts mentioned by about 36 per cent.-H. L. MANUEL, Viticulture Expert.

## Appeal for Sheepskins for Russian Red Cross.

THE Russian Medical Aid and Comforts Committee is appealing for gifts of sheepskins for the Russian Red Cross Society in Moscow. resistance of the Russian Army and people will be rendered a little less tragic and hazardous during the winter by the provision of warm clothing and bedding.

Since the outbreak of the war in the Pacific, the Government has prohibited the export of any medical supplies, and the Russian Medical Aid and Comforts Committee has concentrated on the purchase and dressing of sheepskins, sending them to the Russian Red Cross Society in Moscow by the Soviet ships that call at Australian ports.

Russia has millions of wounded, and untold numbers of people who have lost their homes and all they possess. The cold of the Russian winter is intense, and the lives of many wounded and homeless men, women and children often depend on whether they have warm clothing and bed-

ding. Russians make coats, gloves, caps, leggings, and rugs from dressed sheepskins. The ambulances picking up the wounded are equipped with sheepskin rugs.

In order to conserve funds to pay for dressing the skins, the Committee is appealing for gifts of Undaniaged skins, from off shears too short for appraisement to any length, are accept-

Messrs T. Dewez & Co. have kindly made their services available to the Committee to classify skins and to arrange for their distribution to the various dressers. Gift skins should be addressed as under:-

GIFT SKINS-NOT FOR SALE.

Russian Medical Aid and Comforts Committee. c/o. T. Dewez & Co., Darling Harbour, Sydney.

The Railway Department has agreed to carry such skins per goods trains free of charge.

# Keep On Buying War Savings Certificates.

# A. K. Trethowan Memorial Scholarship at Hawkesbury Agricultural College.

This scholarship, valued at £40 per annum, will be available for competition among lads whose parents or guardians have been for at least two years prior to the date of each award, (a) financial members of the New South Wales Farmers and Settlers' Association, or (b) subscribers to "The Land," or (c) actively engaged in primary production. The scholarship has been provided by "The Land" and the Farmers and Settlers' Association as a memorial to the late Sir Arthur Trethowan. The scholarship will be tenable for three years in the case of holders entering the first year and for two years for those entering

the second year of the Diploma in Agriculture course at Hawkesbury Agricultural College.

Candidates must be not less than 16 nor more than 10 years of age at date of commencement of the first session of the College year, and must be natural born British subjects. The award of the scholarship will be determined mainly on the results of the Internediate Certificate Examination, but full details of the educational requirements and other conditions, together with application forms, may be had from the Editor of "The Land," Box 1558E, G.P.O., Sydney. The closing date for application for the first award is 5th January, 1943.

### Nitrate of Soda Now Available.

FOLLOWING the recent rains in coastal districts, conditions are favourable for the use of nitrogenous fertilisers on vegetables and certain fruits Nitrate of soda is now available for sale to growers of vegetables, fruits and sugar cane at £18 10s. per ton, ex stores, Sydney.

Distribution is in the hands of leading fertiliser houses, and growers may obtain supplies direct from such firms, or through storekeepers and agents. Before purchasing nitrate of soda, such growers must provide particulars of the area of the crop or crops for which the fertiliser is re-

quired, and the distributor will calculate the quantity to which the grower is entitled under the rationing regulations, prior to effecting delivery. Those who have already received sulphate of ammonia will not be entitled to purchase nitrate of soda for the same crops.

This release of nitrate of soda for agricultural purposes should prove of special value to growers of citrus and other fruits, who have been unable to secure nitrogenous fertilisers to maintain the condition of their trees and stimulate production.

### Contracts Available for Winter Potato Production.

There has been an excellent response from coastal and other growers to the recent appeal by the Department of Agriculture for increased potato production, but unfortunately, owing to an unfavourable season, yields will not be up to expectations. To make up the deficiency it has been decided to write contracts with coastal growers for winter potatoes, on similar terms and conditions to those being offered to tableland growers. This includes a minimum price guarantee of £8 10s. per ton Sydney for Factors, or the existing market price, if higher. A premium of 10s. per ton will be paid for Satisfaction or Brownells. Contracts are available from the Dis-

trict Agricultural Instructor, or Fruit Inspector, or direct from the Department of Agriculture.

Almost an unlimited quantity of these potatoes is needed. Growers should retain sufficient seed from their spring planted crop to meet their requirements. The small tubers, if planted whole, are quite suitable for seed.

Owing to the early part of the season being dry, potato moth may be troublesome on the coast, and growers should make every effort to prevent seed being damaged. Methods of treatment of seed potatoes for prevention and control of potato moth infestations are available from the Department of Agriculture.

## 1943-44 Egg-laying Competition.

Poultry-farmers are reminded that applications for pens in the 1943-44 Egg-laying Competition to commence at Hawkesbury Agricultural College, Richmond, on 1st April, 1943, will close on 6th January, 1943,

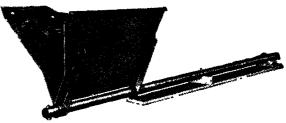
by which date the application form showing particulars of stock owned at 31st December, 1942, must be in the hands of the Principal, Hawkesbury Agricultural College, Richmond.

# It isn't clever to talk of military matters. It's Disloyal.

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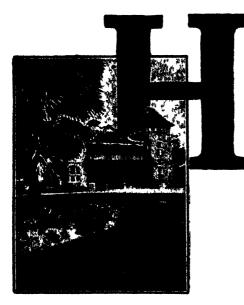


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DEPARTMENT OF AGRICULTURE, NEW SOUTH WALES.



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Write for further particulars, prospectus, and application forms to

The Principal, or The Under Secretary and Director,

Hawkesbury Agricultural College Department of Agriculture,

Richmond Box 36A, G.P.O., Sydney.

### Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Owner and Address.	Number Tested.	Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
		1942.			1943.
F. and C. Ryall, 5 Western Avenue, West			J. De Ville, Inverell	10	15 May.
Wollongong J. I. Toohev, "Mandemar," Berrima	57	1 Nov.	Cowra Experiment Farm	41	27 June.
J. I. Toohev, "Mandemar," Berrima	56	8 ,,	P. M. Burtenshaw, Killean, Inverell	ġī l	27 ,,
W. J. Stephenson, "Hill View," Fig Tree	23	10 ,,	A. E. Liggins, "St. Leger Dairy," Kuring-gai		
W. C. Wyatt, Sherwood Road, Merrylands	29	12 ,	Chase Road, Turramurra North	52	7 July.
Lunacy Department, Gladesville Mental	- 1		Farm Home for Boys, Mittagong	49	9 ,,
Hospital	22	14 ,,	Farm Home for Boys, Mittagong Kahlua Pastoral Co., "Kahlua," Coolac	314	10 ,,
Hawkesbury Agricultural College, Richmond			Lunacy Department, Rydalmere Mental		
_ (Jerseys)	128	18 ,,	Hospital	65	30 ,,
Bathurst Experiment Farm (Ayrshires)	21	18 ,,	W. J. Frizelle, Rosenstein Dairy, Inverell	76	I Aug.
E. L. Killen, "Pine Park," Mumbil	201	20 ,,	W. Budden, "Hunter View," Kayuga Road.		i
C. Brownlaw, Gol Gol	34	26 ,,	Muswellbrook	18	5 ,,
Haristone Agricultural High School, Glen-	1	_	T. McLane, Wellingrove, Inverell	33	10 ,,
_ field	33	26 ,,	W. Willis, "Rosedale," Inverell	17	13 ,,
C. I. Fairbairn, Woomargama	210	26 ,,	A. Hannaford, Braidwood	20	26 ,,
W. W. Martin, "Narooma," Urana Road,			W.S. Grant, Braidwood	20	26 "
Wagga	150	29 .,	J. McKenzie, Inverell	35	28 ,,
A. G. Wilson, Exeter (Jerseys)	68	29 ,,	Farrer Memorial Agricultural High School,	i i	
Segenhoe Estates, Scone	65	30 ,,	Nemingha	39	29 "
	ŧ		The William Thompson Masonic School,	}	
McGarvie Smith Animal Health Farm, Liver-		1943. 1 Feb.	Baulkham Hills	50	29 ,,
_ pool	65	I Feb.	Navua Ltd., Grose Wold, via Richmond		
Lunacy Department, Parramatta Mental		_	(Jerseys)	113	4 Sept.
Hospital	31	6 ,,	Australian Missionary College, Cooranbong	113	8 ,,
The Sydney Church of England Grammar			Department of Education, Gosford Farm	1	1
School, Moss Vale	55	6 ,,	Home	40	29 ,,,
Tudor House School, Moss Vale	17	6 ,,	Barnardo Farm School, Mowbray Park	75	4 Oct.
Koyong School, Moss Vale	2	6 ,,	A. L. Logue, "Thornbro," Muswelibrook	46	13
New England Girls' Grammar School, Armidale		6 ,,	Wollongbar Experiment Farm	112	4 Dec.
A. E. Stace, Taylor Street, Armidale	31	7	State Penitentiary, Long Bay	10	9 ,,
New England University College, Armidale W. Boland, "Seaton," Inverell		I Mar	Times d Dans Marieset		1944.
Parker Bros., Hampton Court Dairy, Inverell	105	1 ,,	Limond Bros., Morisset C. Wilton, Bligh Street, Muswellbrook	60	13 Jan. 3 Feb.
A. D. Frater, King's Plain Road, Inverell	104	I .,	Department of Education, Yanco Agricultural	75	3 Feb.
A. C. O'Dea, Perry Street, Dundas	28		frimb Cabaal	60	6
Trangie Experiment Farm, Trangie	138	1	Riverina Welfare Farm, Yanco	,	~ تا
Emu Plains Prison Farm	100	1 -=	N. L. Forster, Abington, Armidale (Aberdeen	74	ъ.,
Lunacy Department, Morisset Mental Hospital			Angus)	188	12
Berry Training Farm, Berry	114	2 April.	Forster and Sons, Abington Armidale (ferseys)		13 "
R. C. Dixon, Elwatan, Castle Hill (Jerseys)	23	_	Wagga Experiment Farm (Jerseys)	81	20 ,,
St. Michael's Orphanage, Baulkham Hills	18	5 ,,	St. Ignatius College, Riverview	25	27 ,,
Liverpool State Hospital and Home	102	10 ,,	Lunacy Department, Callan Park Mental		-/ "
F. C. Harcombe, Hillcrest Farm, Warialda		"	Hospital	26	и Мау.
Road, Inverell	32	15 ,,	T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 June.
A. N. De Frainc, Reserveir Hill, Inverell	22	15 "	New England Experiment Farm, Glen Innes		
Grafton Experiment Farm	100	17 "	(Terseys)	73	27 ,,
K. W. D. Humphries, "Karoola," Muswell-		1 "	G. T. Reid, "Narrengullen," Yass	274	3 July.
brook	162	24 ,,	St. Vincent's Boys' Home, Westmead	26	20 ,,
H. F. White, Bald Blair, Guyra (Aberdeen		, "	Lidcombe State Hospital and Home	106	30 ,,
Angus)	137	26 ,,	N. last, Gum Flat Road, Inverell	61	13 Aug.
Sir F. H. Stewart, Dundas	6	30 ,,	Ehsman Bros., Invereil	28	13 "
S. E. E. Cohen, Auburn Vale Road, Inverell	23	12 May.	Peel River Land and Mineral Co., Tamworth		1
B. N. Coote, Auburn Vale Road, Inverell	42	14	(Beef Shorthorns)	82	28 ,,

### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Invereil Area. Braidwood Area. Municipality of Muswellbrook.
Municipality of Queanbeyan.
Max Henry, Chief of Division of Animal Industry.

## Beekeeping Hints—continued from page 527.

The truck may be used for lifting and transporting heavy supers of honey from the apiary to the honey-room, and for lifting and loading hives of bees or supers of honey direct on to a transport vehicle. In the latter case a couple of sound planks are used to form a gangway.

## Brucellosis-free Herd Scheme (Swine).

### LIST OF ACCREDITED HERDS.

The following is a list of the names and addresses of owners of herds which have been declared brucellosis-free in accordance with the requirements of the Brucellosis-free Herd Scheme (Swine). The work in connection with this scheme has been undertaken as part of the general campaign against this disease and should perform a valuable service to the industry generally. Owing to the limitations of staff it will not be possible for the Department to undertake the testing of herds in general for this purpose and in future only herds belonging to Government institutions, registered stud herds, or those containing a preponderance of registered stud animals, will be accepted for inclusion in the list. A charge will be made for the work, since the inclusion of a herd in this list should be of benefit to the owner. After a herd has been accredited, two semi-annual tests will be required, and thereafter annual tests, provided that the conditions outlined in the agreement form are strictly adhered to and that negative results are obtained at each test. So far as the elimination of the disease is concerned, apart from placing the herd on the accredited list, this work will continue as at present.

### Registered Stud Herds.

Registered & Adams, J. P., "Melton," Daysdale.
Bathurst Experiment Farm, Bathurst.
Boardman, C., Camden.
Campbell, D., Hillangrove, "Wamberal," via Gosford.
Chapman, G. E. and Son, "Illabo Park," Alectown.
Cocks, F. D., "Condalarra," Gooloogong.
Cowra Experiment Farm, Cowra.
Croft, F., Lugwardine, Kentucky.
Draper, R. E., "Glengar," Capertee.
Farrer Memorial Agricultural High School, Nemingha.
Foley, Mrs. E., Bligh Stud Piggery, Water Lane, Rouse Hill.
Grafton Experiment Farm, Grafton.
Harris, K. H., Pennant Stud Piggery, Purchase Road, West
Pennant Hills.
Hawkesbury Agricultural College, Richmond.
Holland, A. L., Argonne, Tubbul.

Huristone Agricultural High School, Glenfield.
Maybin, N. C., Towac, Orange.
McCaughey Memorial Agricultural High School, Yanco.
New England Experiment Farm, Glen Innes.
Newington State Hospital and Home, Newington.
Riverina Welfare Farm, Yanco.
Government Agricultural Training Farm, Scheyville.
Shirley, G. F., "Camelot," Penrith.
Smith, J. M., Eulo Glen, Urana.
Stewart, Sir Frederick, "St. Cloud," Dundas.
Wagga Experiment Farm, Bomen.
White, A. N., Blakeney Stud, Orange.
Williams, G. R. B., "Gwandalan," Grenfell.
Wilson, A. G., Blytheswood, Exeter.
Wollongbar Experiment Farm, Wollongbar.

### Herds Other than Registered Stud Herds.

Bathurst Gaol, Bathurst.
Berry Training Farm, Berry.
Brookfield Afforestation Camp, Mannus.
Callan Park Mental Hospital, Callan Park, Rozelle.
Croft, H. M., "Sallsbury Court," Uralla.
Glen Innes Prison Camp, Glen Innes.
Gosford Farm Home for Boys, Gosford.
Goulburn Reformatory, Goulburn.
Kenmore Mental Hospital, Kenmore, via Goulburn.

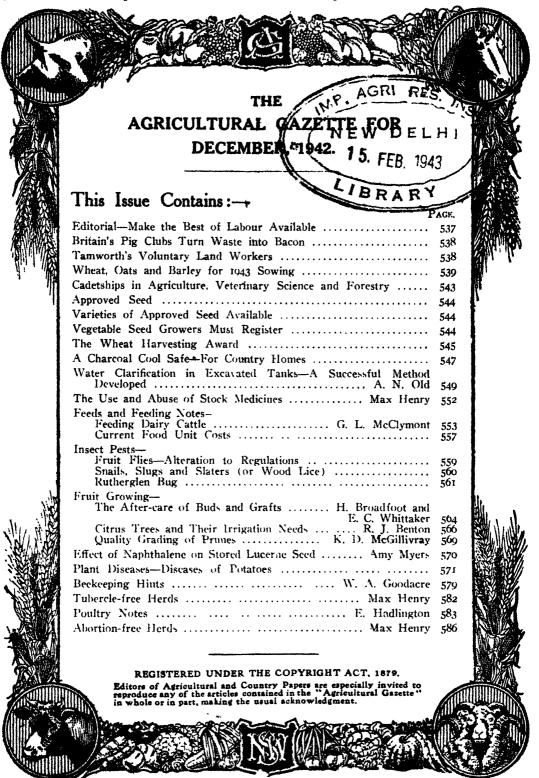
Morisset Mental Hospital, Morisset.
Orange Mental Hospital, Orange.
Parramatta Gaol, Parramatta.
Parramatta Mental Hospital, Parramatta.
Peat and Milson Islands Mental Hospital, Hawkesbury River.
Pollak, V., Marata, Harrow Road, Glenfield.
Smith, C. W. J., "Norbiton," Canadian Lead.
Stockton Mental Hospital, Stockton.
Waterfall Sanatorum, Waterfall.

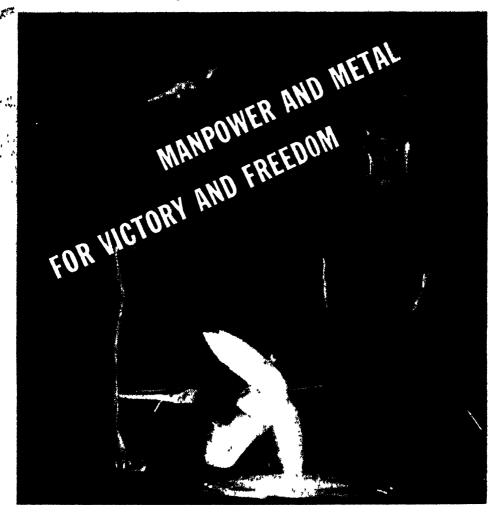
### Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Owner and Address.	Number in herd.		Number in herd.
Forster, N. L., Abington, Armidalt (Aberdeen-Angus). Hawkesbury Agricultural College, Richmond (Jerseys) Hicks A. A., Estate, Culcairn Hill, E. Pritchard, Bowling Alley Pt. (Jerseys) Hordern, E. D., Cabramatta (A.I.S.)	37 71 3, 40 3, 38 24 43 43 43 43 108 108 43 100 95	McEachern, H., Tarcutta (Red Poll) Martin Bros., "Narooma," Urana-road, Wagga Morisset Mental Hospital Navua Lid., Grose Wold, via Richmond Jerseys) New England Experiment Farm, Glen Innes (Jerseys) New England University College, Armidale Peel River Land and Mineral Co., Tamworth Reid, G. T., "Narrangullen," Yass Robertson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Skinner, D. S., "Wyworrie," Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud," Spurway- street, Dundas Trangie Experiment Farm, Trangie Wagga Experiment Farm, Trangie Wagga Experiment Farm, Bomen, N.S.W. Walker, Jas. R., "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen- Angus) Williams, Chas., Ben Lomond Young, A. H., "Rock Lynn," Cudal (Polled Beef Short- horns)	80 132 97 116 82 171 82 57 82 30 66 9 88 81 32

MAX HENRY, Chief of Division of Animal Industry.





# A MESSAGE TO FARMERS

Because International Harvester Company's factory is working "round the clock", moulding and machining iron castings, forging steels, and doing a wide variety of other urgent work in production of guns, tanks, planes, etc., as well as developing new war equipment for our own and allied armies at Australian battle stations, our manpower, metals and machines can't be spared for large-scale production of new farm equipment. Every endeavour, however, is being made to keep up the supply of replacement parts, so that our local agents, at convenient country centres may provide a prompt and expert

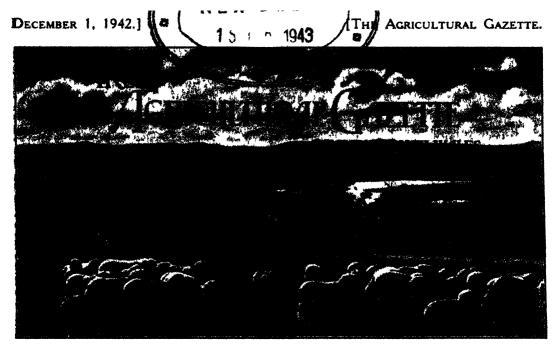
repair service for your International Harvester Company equipment.

Decause our soldiers, war-workers, and civilians must be fed, production of essential food supplies must be maintained. On you, as an owner of vital farming equipment, rests the responsibility of preparing the land, sowing the crop, and gathering the harvest. It is your patriotic duty to take good care of your equipment. Promptly replace worn or broken parts and make your machines work harder than ever before, until Victory is won and Freedom achieved.

# Save all you can — to save all you have BUY AUSTERITY LOAN BONDS

INTERNATIONAL HARVESTER COMPANY OF AUSTRALIA PTY. LTD.
(INCORPORATED IN VICTORIA)

BRANCHES IN ALL CAPITAL CITIES



The Agricultural Gazette.

December, 1942.

# MAKE THE BEST OF LABOUR AVAILABLE.

TO date there have been very few inquiries for labour from the large pools available from city areas during the forthcoming Christmas holiday period. Special committees have been set up to organise these groups, and they are becoming increasingly concerned about the likelihood of not being able to place all the labour offering. These groups include teachers, schoolboys, University students, and men and women on annual leave.

It is not difficult to understand the farmer's demand for the most efficient labour, but if that wholly efficient labour is already in the fighting forces, the farmer or any other employing section of the community, will be rendering the nation best service by insisting only on the most efficient labour available outside the army

For many farm operations the type of labour offered by these city pools will undoubtedly prove satisfactory. Already in some centres it has been tried and earned nothing but praise. Even in the case of

scheolbovs, farmers can rely upon youth's adaptability, enthusiasm and energy to see through any job within its capacity. To that has to be added a further incentive the desire to serve the nation in its hour of trial. And that applies, not only to schoolboys, but to all other city labour pools.

It has to be admitted that some of the casual, or pool labour offering will not prove 100 per cent efficient, judged by normal standards, but that should be accepted as more or less inevitable at a time when the

### W.L.A. Harvest Cherry Crop at Young.

Faria last month the War Agricultural Committee at Young advised that no further assistance was required from the casual labour pools offering for cherry harvesting. Grovers had contracted for their full requirements from the Women's Land Army reports. We P. F. Gaby Secretary of the Young Committee. Bout 1600 had been spent by local orchardists in proxiding accommodation for restring labour.

nation has been forced to change over from a peacetime to a wartime economy. Every section of the community, including, of course primary producers, has been and will continue to be inconvenienced in very many ways. Some sections have already suffered considerable financial loss many secondary industries (considered unessential in wartime, but most essential normally) have been forced out of existence. This is part of the price that has to be paid for victory.

Only the foolhardy will persist in their efforts to maintain normal standards during such perilous times. That applies to labour, materials and services, and the sooner the farming community realises the stark neces-

sity which dictates the present position of affairs (be it ever so unsatisfactory in some respects) the sooner will it realise how necessary it is to make the fullest use of every man, woman and youth offering. Until that is done, any demand for releases from the army is designed to help the enemy rather than Australia.

# Britain's Pig Clubs Turn Waste into Bacon.

A FIFTY per cent. increase on normal production of pigmeats is the aim of New South Wales' producers for the next year. The task of achieving this objective will be difficult, but not impossible, provided no factor in breeding, feeding and management, and in organised effort, is overlooked.

Perhaps we can learn something from Britain's wartime pig-raising programme In that country amateur pig-keepers have banded themselves into small clubs. Schools, hospitals, fire and police stations, hotels and factories are all joining in the movement to turn kitchen and garden waste into bacon. There are now over 3,000 clubs in Britain, and it is estimated that they will contribute 20,000,000 lb. of bacon each year to England's food production programme. Eighty new pig clubs are being formed each week

Workers in hundreds of war factories are finding that a pig club attached to their canteenmeans not only extra meat, but choice meals of pork or bacon which otherwise they would not see. Provided the club sells half its pigs to the British Ministry of Food, the remainder can be killed for consumption without affecting the canteen's normal meat allocation.

Some of the clubs are run co-operatively, the pigs being kept in a communal sty and owned jointly by the members, all of whom bear a hand in looking after them. Others are pig-owners clubs, in which each member tends his own pigs on his own premises.

Most of the people forming clubs to-day previously knew little or nothing about keeping pigs, but all assistance and advice, as well as special supplementary meal allowances and insurance facilities, are provided by the Small Pig Keepers' Council, Henley-on-Thames.

# Tamworth's Voluntary Land Workers.

THE Voluntary Land Army idea is fast spreading from town to town in New South Wales. It needs no prophetic vision to predict that it will soon become a factor of first-rank importance in helping the nation to achieve its wartime production goals

Among the many accounts to hand of excellent work done on week-ends and holidays by groups of townspeople is a report from the Tamworth War Agricultural Committee telling how fifteen

employees of a local starch mill stooked 25 acres of oats in one hour on a recent Sunday morning. Because of the short time taken to complete the job, the men decided to forgo payment, and the owner of the crop, Mr. J. A Woods, of Calala, is paying the amount into a patriotic fund.

These voluntary land workers had had no previous experience in farm work, yet put the job through efficiently and to the entire satisfaction of the farmer.



Tamworth Townsmen Stooking Oats at Calala,



It is at Harvesting that the Relative Merits of Different Varieties Become Apparent

# Wheat, Oats and Barley for 1943 Sowing.

## Recommended Varieties.

### WHEAT.

# UNLESS otherwise mentioned, the varieties of wheat recommended for 1943 sowing, listed below, are suitable for both grain and hay.

The farmer who limits the varieties used to two or three of those recommended as being best suited to his zone will find that not only arc his yields improved, but, among other benefits, less work is involved in harvesting and less care is necessary to maintain the purity of the seed

These recommendations are made by the Wheat Advisory Committee Millers representatives, in agreeing to the recommendation of Beneubbin, stated that the growing of Nabawa would be appreciated, provided farmers were satisfied that the conditions gave a reasonable prospect of the yield being not less than that of Beneubbin As a rule the latter gives a better yield than Nabawa

In the following recommendations, the term "Early Sowing" means the first sowings within the suitable sowing time according to the district "Mid-season" sowings are made after the early sowings, "Late" sowings are the last sowings of the season

Sowings out of season, either very early or very late, usually result in poor yields

I arly and very early maturing varieties must not be sown early, and late maturing varieties must not be sown late

### NORTHERN WHEAT BELT.

### Zone 1: Northern Tableland.

(Armidale (Ilen Innes)

Mid season Sowing—Ford Luicka 2

Late Sowing—Fuieka

# Zone 2: North-western Slopes—Eastern Portion.

(Warialda, Delungra, Inverell Bingara, Barraba, Attunga, Tamworth, Quirindi and Upper Hunter Districts)

Early Sowing—Fedweb 1, Ford Mid scason Sowing—Bencubbin (light soils), Ford, Eureka, Eureka 2 Late Sowing—Gular, Pusa 4 Pusa 111

# Zone 3: North-western Slopes—Western Portion.

(Manilla, Somerton, Curlewis, Gunnedah, Boggabii, Mullaley, Tambar Springs) Farly Sowing—Fedweb 1, Ford Mid-season Sowing—Benicubbin, Eureka, Eureka 2

Late Sowing -Gular, Pusa 4 Pusa 111

### Zone 4: North-western Plains.

(Boggabilla, Garah, Gravesend, Pallamallawa, Bellata, Narrabri, Baan Baa, Wee Waa, Pilliga, Baradine, Coonamble.)

Early Sowing—Ford, Fedweb I (in limited areas).

Mid-scason Sowing—Bencubbin, Eureka, Eureka 2.

Late Sowing-Gular, Pusa 4. Pusa 111.

### CENTRAL WHEAT BELT.

### Zone 5: Central Tableland.

(Bathurst' to Orange Districts.)

Mid-season Sowing—Bordan, Ford, Waratah.

Late Sowing-Waratah.

# Zone 6: Central-western Slopes-North-eastern Portion.

(Coonabarabran, Binnaway, Mendooran, Leadville, Coolah, Dunedoo, Gulgong, Mudgee, Wellington, Geurie.)

Early Sowing--Ford, Bordan.

Mid-season Sowing—Bencubbin, Baroota Wonder (for hay only), Eureka 2.

Late Sowing—Gular, Eureka.

# Zone 7: Central-western Slopes-Central-eastern Portion.

(Molong, Manildra, Cumnock, Cudal, Cargo.)

Early Sowing—Bordan, Ford.
Mid-season Sowing—Waratah, Bencubbin.

### Zone 8: Central-western Slopes—Southeastern Portion.

(Cowra, Canowindra, Eugowra, Goolagong, Koorawatha, Greencthorpe, Grenfell)

Early Sowing-Bordan, Ford.

Mid-season Sowing - Dundee (for grain only), Waratah, Beneubbin.

# Zone 9: Central-western Slopes-North-western Portion.

(Tooraweenah, Gulargambone, Gilgandra, Eumungerie, Dubbo, Wongarbon, Tomingley)

Early Sowing—Ford.

Mid-season Sowing - Dundee (for grain only), Bencubbin

Late Sowing-Gular.

### Zone 10: Central-western Slopes-South-western Portion.

(Parkes, Forbes, Bogan Gate, Peak Hill, Trundle.)

Early Sowing—Ford.

Mid-season Sowing—Dundee (for grain only), Bencubbin.

Late Sowing-Gular.

# Zone 11: Central-western Plains-Northern Portion.

(Albert, Tottenham, Trangie, Narromine, Condobolin, Euabalong.)

Early Sowing—Bencubbin, Baroota Wonder (for hay only).

Mid-season Sowing-Gular.

### Zone 12: Central-western Plains— Southern Portion.

(Cargelligo, Tullibigeal, Hillston, Merriwagga, Weethalle, Rankin's Springs, Yenda, Griffith.)

Early Sowing—Bencubbin. Mid-season Sowing—Gular.

### SOUTHERN WHEAT BELT.

### Zone 13: Southern Tableland.

(Goulburn, Yass, Federal Territory, Tumbarumba)

Mid-season Sowing-Ford, Waratah.

# Zone 14: South-western Slopes-Eastern Portion.

(Young, Boorowa, Bendick Murrell, Murrumburrah, Wallendbeen, Cootamundra, Stockinbingal.)

Early Sowing -Bordan, Ford.

Mid-season Sowing - Waratah, Bencubbin.

# Zone 15: South-western Slopes—Central Portion.

(Bribbaree, Quandialla, Caragabal, Temora, Ariah Park, Barmedman.)

Early Sowing-Bordan, Ford.

Mid-season Sowing—Dundee (for grain only), Bencubbin.

# Zone 16: South-western Slopes-Western Portion.

(Wyalong, Ungaric, Barellan, Ardlethan, Tallimba.)

Early Sowing—Ford.

Mid-season Sowing—Dundee (for grain only), Bencubbin.

Late Sowing—Gular.

### Zone 17: North-eastern Riverina.

(Junee, Marrar, Coolamon, Wagga, Uranquinty, The Rock, Milbrulong, Lockhart.)

Early Sowing—Zealand (for hay only), Bordan, Ford.

Mid-scason Sowing—Dundee (for grain only), Baroota Wonder (for hay only), Bencubbin.

### Zone 18: South-eastern Riverina.

(Yerong Creek, Henty, Pleasant Hills, Culcairn, Holbrook, Walbundry, Walla Walla, Gerogery, Jindera, Albury, Brocklesby, Balldale, Corowa.)

Early Sowing—Bordan, Ford.

Mid-season Sowing—Dundee (for grain only), Bencubbin.

### Zone 19: North-central Riverina.

(Ganmain, Grong Grong, Narrandera, Darlington Point, Boree Creek, Urana.)

Early Sowing—Ford.

Mid-scason Sowing—Dundee (for grain only), Bencubbin.

Late Sowing—Gular.

### Zone 20: South-central Riverina.

(Rand, Daysdale, Oaklands, Jerilderie, Berrigan, Finley, Tocumwal, Mulwala.)

Larly Sowing—Ghurka (for grain only)
Mid-scason Sowing-- Ranee and Dundee
(for grain only), Bencubbin,

### Zone 21: Western Riverina.

(Deniliquin, Mathoura, Moama.)

Early Soveing—Ghurka (for grain only).

Mid-season Soveing—Ranee and Dundee

(for grain only), Bencubbin.

### Zone 22: Far Western Riverina.

(Moulamein, Balranald, Euston.)

Early Sowing—Ranee (for grain only).

Bencubbin.

# Zone 23: Murrumbidgee Irrigation Area (on irrigated areas).

Early Sowing—Bordan, Ford.

Mid-season Sowing—Waratah, Bencubbin.

Late Sowing-Waratah.

### COASTAL DISTRICTS.

Early maturing varieties for hay or green fodder—Waratah, Florence.
Early Sowing only—Ford.

# Notes on Recommended Wheat Varieties.

BRIEF notes on the foregoing recommended varieties are given hereunder as a guide to farmers in the choice of the best varieties of wheat for their conditions:—

### Order of Sowing.

Early sowing—Ford type of wheat.

Mid-season sowing—Bencubbin type of wheat.

Later sowing—Gular type of wheat.

Baroota Wonder.—Essentially a hay wheat of excellent quality and acre yield for mid-season and later sowings. Farmers are strongly urged to sow the headlands of paddocks (which are usually cut for hay) with this variety. The growth is moderately tall, with slender, heavy weighing stems which cure to a desirable green colour. The leaves are moderately sparse, and generally free of disease troubles. The variety is slightly resistant to flag smut, but is susceptible to stem rust.

Beneubbin.—A popular wheat of midseason sowing, highly resistant to flag smut, and possessing a moderate resistance to stem rust. On account of its tall growth and tendency to lodge, it should not be grown on over-rich soils or in districts of high rainfall, where Ford is a better variety. The grain bleaches fairly readily, and although classed as a weak flour wheat, it matures a bright grain of moderately good flour when grown within the lower rainfall districts. It is recommended for dry districts in place of Nabawa. The area sown to this variety has become excessively great, and its part replacement with medium strong varieties would ease some problems connected with flour blends and export shipments.

Bordan.—A variety lately recommended for early sowings within favoured rainfall districts. It is tall growing, moderately resistant to stem rust and flag smut, and the grain is of the medium strong flour class. In many respects Bordan resembles Ford, and is likely to replace it in districts of good rainfall, as it has a higher yielding capacity. It does not, however, finish quite as well should the late spring conditions be dry. As a hay wheat, it is not quite the equal of Ford in quality.

Dundee.—A productive variety for midseason sowing; moderately short strong straw; moderately resistant to flag smut but susceptible to stem rust and frost damage. It is classed as a medium strong flour wheat, and under suitable dry ripening conditions produces a vitreous grain, but it frequently produces a mottled grain.

Eurcka.—A mid-season sowing wheat of medium height and fairly strong straw, highly resistant to stem rust, and moderately susceptible to flag smut. It produces a medium strong flour of high quality, and is suited to the conditions of Northwestern New South Wales. It is susceptible to Septoria.

Eureka 2.—A selection from Eureka from which it differs in being slightly taller in growth and about a week later in maturity.

Fedweb 1.—A short, strong straw variety suited to early sowings, particularly within the North-western portion of New South Wales. It is highly resistant to stem rust, but susceptible to leaf rust, flag smut and Septoria. The grain, which is held firmly, is in the medium strong flour class and is of high quality.

Florence.—A wheat suited to late sowings, with tall, slender straw. Moderately resistant to flag smut and to stem rust. Highly resistant to bunt. The grain is very subject to shedding. It is generally hard and vitreous, with medium strong flour. Recommended only for green fodder and hay in coastal districts.

Ford.—A variety suited to early sowings within favoured rainfall areas. It is tall growing, possessing straw which picks up and combs well, or makes into hay of good colour and quality; it is moderately resistant to stem rust and flag smut, and the grain is of the medium strong flour class; the flour, however, is slightly deficient in gassing power. Ford "finishes" better than most varieties even though the late spring may be dry, and the grain also appears to have a satisfactory resistance to bleaching. It is recommended for extensive sowings in all but the lower rainfall districts.

Ghurka.—A variety suited to early sowing within the Western Riverina, possessing very short strong straw. Resistant to flag smut and has some resistance to stem rust. Grain of weak flour strength.

Gular.—A wheat suitable for late sowing within favoured districts and for midseason sowing within the drier districts. It is susceptible to flag smut and to stem rust. It is in the medium strong flour class. The grain is generally hard and vitreous, being but little inferior to Pusa 4 in baking quality, and therefore a high premium wheat.

Pusa 4.—A late sowing variety, with slender straw. Somewhat resistant to flag smut. Susceptible to stem rust. Grain generally hard, and in the strong flour class. On account of its relatively light yield it is suitable only for a few localities in northern districts.

Pusa 111.—A smooth-chaffed selection from Pusa 4, to which it is similar in all other characters.

Rance.—A mid-season sowing wheat, with short, fine but strong straw. Susceptible to flag smut and to stem rust. A weak flour wheat.

W'aratah.—A tall-growing variety suited to mid-season sowing. The straw is slender, but picks up and combs well should the crop become lodged. It is susceptible to flag smut. The grain is of the weak flour class. Ripe crops are liable to shed. Most of the area previously sown to Waratah is now sown to Bencubbin.

Zcaland—A variety suited to early sowing and which produces high yields of hay of excellent quality in favourable districts. It is highly resistant to flag smut, but susceptible to stem rust. The straw is very tall, but stands fairly well. It is recommended only for hay.

### Oats and Barley Recommendations.

ONE of the essentials to success in the growing of the winter cereals, oats and barley, is to sow varieties suited to the climatic and soil conditions.

The following are the recommendations of the Department of Agriculture for the 1943 sowing season for different districts and purposes:—

# OATS. North Coast.

For early green fodder—Sunrise, Buddah. For grazing—Fulghum, Algerian.

### South Coast.

For early green fodder-Belar, Sunrise, Mulga, Buddah.

For grazing-Algerian, Fulghum. For late green fodder-Algerian.

### Northern Tableland.

For grain, hay, or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing)— Lampton.

For grazing only (autumn sowing)— Fulghum.

For grain or hay (spring sowing)—White Tartarian, Lampton.

### Central Tableland.

For grain, hay or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing)— Lampton.

For grazing only (autumn sowing)-Fulghum.

For grain or hay (spring sowing)—White Tartarian, Lampton.

### Southern Tableland.

For grain, hay or grazing (autumn sowing)—Algerian.

For grain or hay (autumn sowing) -Lampton.

For grazing only (autumn sowing)-Fulghum.

For grain or hay in coldest parts (spring sowing)—White Tartarian, Lampton.

### North-western Slopes and Upper Hunter.

For grain, hay or silage—Algerian, Belar, Burke, Mulga, Buddah. For grazing—Algerian, Burke, Fulghum.

### Central-western Slopes.

For grain, hay or silage—Algerian, Belar, Burke.

For grain, hay or silage in drier parts— Gidgee.

For grazing—Algerian, Burke, Fulghum.

### South-western Slopes and Eastern Riverina.

For grain, hay or silage—Algerian, Belar. Burke.

For grazing—Algerian, Burke, Fulghum.

### Western Plains and Western Riverina.

For grain, hay or silage-Belar, Burke, Gidgee, Mulga.

For grazing—Burke, Fulghum.

### Murrumbidgee Irrigation Area.

For grain, hay or silage—Algerian, Belar, Burke.

For grazing—Algerian, Burke, Fulghum.

### BARLEY.

### Recommended Varieties.

The varieties of barley recommended by the Department are:—

> Malting or two-row type—Pryor. Feed or six-row type-Trabut (for green fodder or grain).

# Cadetships in Agriculture, Veterinary Science, and Forestry.

THE Public Service Board invite applications for cadetships in the Department of Agriculture (Agriculture and Veterinary Science cadets) and in the Forestry Commission. Applications will be received after the Leaving Certificate results have been aunounced. They should be submitted on Form 61, obtainable from the office of the Board, or the Government Printing Office, and should reach the Board not later than 23rd January, Applications will not be accepted from

candidates over twenty-one years of age.

All cadets will be paid an allowance of £110 per annum (weekly equivalent) during training, and fees for tuition will be met by the Government. The training period will be four to five years for Agriculture and Veterinary Science cadets and four years for Forestry cadets. During vacations cadets will be given field, laboratory

and office practice They will be allowed three

weeks' recreation leave per annum

Applicants must be duly qualified for admission to the University as matriculated students in the faculties to which the cadetships apply, and will be required to attend an examination in precis writing at a date to be fixed.

Appointees must be prepared to enter into a bond, with two surcties, in the sum of £500, to persevere with their courses of training, leading to the award of the appropriate degree of B.Sc. Agr., B.V.Sc., B.Sc. or B.Sc.For, and continue in the service for a period of five years thereafter.

On satisfactory completion of training, cadets will be employed on appropriate work, and paid in accordance with the award or agreement applicable to the position.

### Buy War Savings Certificates. Help Win the War.

# Approved Seed.

# December, 1942.

To assist in the production and distribution of approved seed of recommended varieties of crops and vegetables, the Department publishes in this list each month the names and addresses of growers of such seed. For this service a charge of 2s. 6d. is made for each insertion of each variety listed. The number of varieties listed on behalf of each grower will be restricted to twentyfive for the time being. The Department may inspect the crop producing the seed, and in all cases a sample of the seed must be sent to the Department of Agriculture with information as to the location of its production, and must be accompanied by the fee indicated above

If any seed producer does not wish to pay the advertising charge he may submit his name with the variety of seed and sample to the Department, and if it is approved his name will be listed in

the Department and information will be supplied regarding it to inquirers.

Cauliflowers. Shorts-H. Burton Bradley, Sherwood Farm, Moorland.

Hawkesbury Solid White-E. A. Sharp, 110 Gordon-avenue, Hamilton.

Phenomenal Five Months—E. A. Sharp, 110 Gordon-avenue, Hamilton.

Tomatocs. Marvana - Rumseys Seeds Pty. Ltd., 331

Church-street, Parramatta. Australian Earliana—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta. Rouge de Marmande—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

Red Marhio No. 05—Rumseys Seeds Pty. Ltd., 331 Church-street, Parramatta.

# Varieties of Approved Seed Available.

In order that farmers may be directed to what are regarded by the Department as the most satisfactory local sources of approved seed of recom-mended commercial varieties of farm crops and vegetables, the Department is willing to supply information concerning such sources of seed of the following varieties:-Cauliflowers-

Hawkesbury Solid White, Nugget, Shorts. Onions-

Hunter River White.

Grain Sorghum-Kalo.

Maisc-

Fitzroy, Funk's Yellow Dent.

Pumpkins --

Oucensland Blue.

Grasses, etc.-

Phalaris tuberosa, Subterranean Clover (midseason), Sheep's Burnet, Lucerne.

## Vegetable Seed Growers Must Register.

The attention of vegetable growers (particularly growers of peas and beans) is drawn to the National Security (Vegetable Seeds) Regulations which provide that any person who is not a registered vegetable seed grower in respect of any particular seeds produced by him, shall not sell, exchange or in any way dispose of those seeds for valuable consideration.

Many growers of peas and beans set out to produce green crops with the intention that, if prices are unsatisfactory when the vegetables are ready for market, the crops will be allowed to mature for sale as seed. Growers who propose to follow this practice should apply immediately to the Vegetable Seeds Committee for registration, otherwise they cannot legally dispose of their seed.

The Vegetable Seeds Committee was set up by the Commonwealth Government in the early part

of this year, and it has aimed at the production. in Australia, of the bulk of our seed requirements. It has collaborated closely with the seedgrowing merchants and, through the State Departments of Agriculture, has arranged extensive contracts with growers throughout the Commonwealth. In order to protect the interests of seed growers the Committee is empowered to require the registration of all crops of vegetable seeds being grown for sale. Any grower who disposes of his seed without being registered is liable to prosecution.

Most growers have already registered, but those who have not should make application immediately to the Executive Officer, Vegetable Seeds Committee, Box 199, Canberra. There is no charge for registration.

War Gossip is Dangerous.

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The lifeblood of the nation is transport! No use having Industry food, clothing or any of the other necessities of life without the means of transporting them

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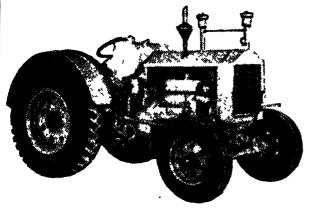
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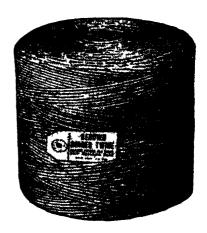
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### THE WHEAT HARVESTING AWARD.

IN pursuance of National Security (Wheat Harvest Employment) Regulations, the Wheat Harvest Employment Commission has made a Determination relating to the terms and conditions of work of employees engaged on manual work in connection with the harvesting of wheat, oats, rye and barley sown during the year 1942.

The Determination came into force and became operative on and from 9th November, 1942, and applies to all employers and employees in the harvesting of wheat, oats, rye and barley sown during 1942, in the Australian Capital Territory, and in the States of Queensland, New South Wales, Victoria, South Australia, Western Australia and Tasmania.

The following are the terms of the Determination:—

### 1. GENERAL CONDITIONS.

All labour to be performed in the various employments hereinafter set out shall be carried on at the rates and conditions hereinafter set out applicable to each and such classes of labour.

### 2. WAGES.

P	er l	mu
w	ith	keer
	s.	d.
Stack builders and thatchers	3	3
Drivers of binder, header, harvester and		
tractor	2	()
Sheaf pitchers		
Stookers		
Platform hands		
Bag sewers for stacking		
Bag sewers, skewer for silo		
All others	2	3

If any of the above functions are performed by piecework and the amount the employee receives under the piecework rate is less than the hourly rate prescribed, the employer shall pay the deficiency to the employee.

### Rates for Youths.

			Per week
			with keep
			s. d
17 years	s <b>an</b> d under		
			Per hour
			with keep.
18 years	and under		. 0 111/4
Over 19	years	• • • • • • • • • • • • • • • • • • • •	. 2 3

Where a weekly wage is stipulated in this Determination there shall be no deduction for time lost through wet weather or any such cause, but the employer shall have the right to utilise the service of such weekly employees on other work.

### 3. Amount for Keep.

If employees find themselves in keep they shall be allowed 26s, 6d. per week.

### 4. Hours.

The ordinary hours of work shall not exceed 48 per week and the week shall commence on Monday morning of each week.

### 5. OVERTIME.

For all time worked over 48 hours in any one week payment shall be made at one and one-half times the hourly rate.

### 6. PAYMENT OF WAGES AND OVERTIME.

Wages and overtime shall be paid by cash, or as mutually arranged, and shall be paid weekly, or as mutually arranged.

### 7. HOLIDAYS.

The following days shall be observed as holidays, namely, Christmas Day, Boxing Day and Monday, 28th December, 1942, and shall be paid for at ordinary rates on an eight-hour basis. If worked, they shall be paid for at double rates for all hours worked.

### 8. FARES AND CONVEYANCES.

Employees shall be conveyed free of cost from railhead or the nearest town to the farm.

### 9. ACCOM MODATION.

Where State legislation exists with regard to accommodation, such legislation shall apply.

### 10. Access to Employees

Any officer authorised by the Australian Workers' Union may enter upon any land of premises on which operations are carried on and inspect the said work, and interview the employees, provided he does not interfere with the working time of the employees.

### 11 COPY OF DETERMINATION TO BE POSTED.

It copy of the Determination shall be posted by the employer in a place which is at all times accessible to the employee.

### 12. SMOKO.

A rest pause of ten minutes in the morning and ten minutes in the afternoon, at times to be mutually agreed upon, shall be allowed without deduction of pay.

### 13 First Aid.

A sufficient supply of First Aid requisites in a suitable container shall be provided by the employer and kept within easy access of the employees.

# 14. QUARTERLY ADJUSTMENT—WAGE RATES. Basic Wage.

(a) For work done on and after the 9th day of November, 1042, and before the first pay period to commence in February,

1943, the basic wage to be paid to adult employees and youths over the age of 19 years shall be the sum of 2s. 3d. per hour.

### Adjustment of Basic Wage.

(b) (i) For work done during each future period of or near a quarter beginning with the first pay period to commence in a February, a May, an August or a November, the amount of the basic wage stated in paragraph (a) hereof shall be adjusted by the following method according to the position and fluctuations (if any) of the Commonwealth Conciliation and Arbitration Courts retail price index numbers.

retail price index numbers.

For the purpose of this Determination the expression "Courts retail price index numbers" or any like expression means the numbers stated to be such index numbers in any document purporting and not proved to be wrongly so purporting to be printed by the Commonwealth Government Printer or to be signed by or on behalf of the Common wealth Industrial Registrar.

- (ii) Adjustment to be based upon the relating of index number 81.0 with 81s., the amount assessed upon that number of the Commonwealth Conciliation and Arbitration Court's declared needs basic wage per week for an adult male
- (iii) The index number for 30 towns (weighted average) is to be applied
- (is) The index number for the calendar quarter next preceding the period of or near a quarter for which the adjustment is made is to be ascertained
- (v) The amount assigned in the following table (or any extension thereof) to the index number division comprising such number is to be ascertained.
- (vi) The needs basic wage shall be of that assigned amount during such period of or near a quarter.

### TABLE.

Original Index Number Division 88 5 80.4.

Index Number Divisions,		Needs Basic Wage (Admistable), Per hour (with keep).
		s. d.
~0.5 - 80 4		. 2 034
80.5 - 81.4		. 2 1
815-824		2 11/4
82.5 83.4		2 11/2
83.5 - 84.4		2 134
84 5 - 85.4		. 2 2
85 5 - 86.4		. 2 21/4
86.5 - 87.4		$2 2^{1/2}$
87.5 - 88.4		. 2 23/4
88.5 - 89.4		2 3
89.5 - 90.4		. 2 31/4
90.5 - 91.4	• • • • • • • • • • • • • • • • • • • •	$2 \ 3^{1/2}$

### TABLE.

### Original Index Number Division 88:5-89:5-contd.

Index Number Divisions.	Basic Wage (Adjustable). Per hour (with keep).
	s. d.
91.5 - 92.4	 . 2 33/4
92.5 - 93.4	 . 2 4
93.5 - 94.4	 . 2 41/4
94.5 - 95.4	 . 2 4 1/2
95.5 - 96.4	 . 2 43/4
96.5 - 97.4	 . 2 5
9 <u>7</u> .5 - 98.4	 . 2 5 1/4
98.5 - 99.4	 $. 2 5\frac{1}{2}$
99.5 - 100.4	 . 2 53/4

Any extension of this table must be of the same construction as the table.

### 15. BOARD OF REFERENCE.

A Committee may sit as a Board of Reference at such times and places as the members may agree or the Commission may fix and may adjourn from time to time and place to place. The functions of the Committee sitting as a Board of Reference shall be--

- To settle disputes as to matters under this Determination.
- 2. To deal with any dispute affecting the amicable relations of the parties.

The decision of a Committee may be reviewed and altered by the Commission on the application of any party to this Determination provided that notice of an application to the Commission to review such decision be given to the opposite party and to the appropriate Committee within seven days of such decision, and an application be lodged with the Commission asking for such review within twenty-one days of such decision, but the Commission may give extended time for such notice and application at any time. Nothing in this clause shall take away from any party the right to apply to the Commission whether for a variation or an interpretation of this Determination.

### 16. PRIFFRENCE.

Preference in employment shall be given to members of the Australian Workers' Union.

### 17. Definitions.

"Commission" means the Wheat Harvest Employment Commission "Committee" means the Local Wheat Harvest Employment Committee. "Keep" means good and sufficient living accommodation and good and sufficient cooked food

# 18. OPERATION AND INCIDENCE OF DETERMINATION,

This Determination shall come into force and be operative on and from the 9th day of November, 1942, and shall apply to all employers and employees in the harvesting of wheat, oats, rye and barley sown during 1942, in the Australian Capital Territory and in the States of Queensland. New South Wales, Victoria, South Australia, Western Australia and Tasmania.

## A CHARCOAL COOL SAFE

# For Country Homes.

WITH the approach of summer the problem of keeping foodstuffs cool must again be faced. In many country areas the use of ice is not possible, and this will be the case in many more areas than usual this summer because of petrol and manpower shortages.

A cooler of the type shown in the drawings on the opposite page can be made by any handy man, and has been shown by experience to be very efficient. The materials required should be available in most country towns.

The cooler consists of a chamber within a double framework, the space between the two frames being filled with charcoal held in position by wire-netting. The chamber is lined with plain iron except for the bottom 6 inches, which is lined with netting.

The door should be lined on both sides with plain iron, be packed with charcoal to preserve the insulation, and should fit neatly. The door entrance should taper, and be lined with ¾-inch boarding all round; a wooden floor should be provided to the chamber. The plain iron roof of the chamber should be carried on rafters to drain off the water, and a plain iron tray should be fitted underneath.

Such a cooler should be strongly constructed. Suitable material would be say 3-inch by 2-inch hardwood; two adjoining sides could be braced diagonally with 3-inch by 1-inch hardwood -though this is not shown in the accompanying diagram. It would be an advantage to paint the framework, before the netting is nailed on, with boiled linseed oil to which enough cement has been added gradually to produce a brushing consistency. This would greatly increase the life of the framework and prevent the staining that would otherwise occur from the wet hardwood.

To operate the cooler it is necessary occasionally to throw a few buckets of water on to the charcoal on top. This water percolates down through the charcoal insulation, and the air passing through the charcoal is cooled, causing it to flow downwards and into the chamber through the netting at the bottom. As the air gains heat, it rises and passes out through the

ventilation holes near the top of the sheet iron sides of the chamber.

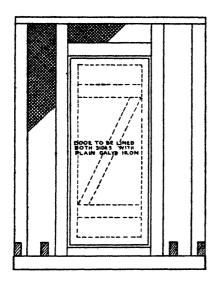
In most country homes the cooler would be used for the storage of meat, butter, milk, etc. Batten shelves could be fitted to carry these foods, though in many cases the goods could be hung up.

### The "Coolgardie" Cooler.

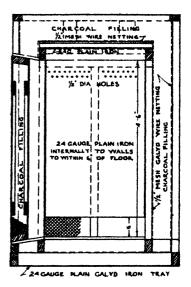
Some may prefer to use what is known as "Coolgardie" cooler, though it requires, say, 2 gallons of water per day for a large cooler, while frequent attention is necessary to keep the equipment in a sanitary condition. It consists of a cube-shaped framework of wood, with a wooden top and bottom, sides of hessian or canvas, and raised on short legs which can be stood in tins or a tray containing water or kerosene to keep out ants. A door is fitted into one side, and airholes, covered with gauze to keep out flies, are made in the top and bottom.

A dish of water is placed on top, and the ends of pieces of flannel or some very absorbent material immersed in the water, the other ends being allowed to hang down the hessian sides. This induces a syphoning action so that the water gradually soaks out to the sides of the cooler, where evaporation takes place, thus causing cooling of the air passing through. The flannel and the hessian or canvas sides must be washed about once a week to keep the pores of the material open and allow water and air to circulate freely.

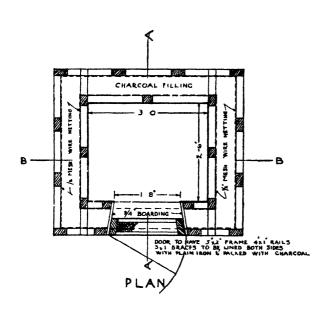
A kerosene tin cut in halves lengthways makes two cheap trays which can be put side by side on top of the cooler, leaving a space between them for airnoles.



FRONT ELEVATION



SECTION AA



CHARCOAL FILLING

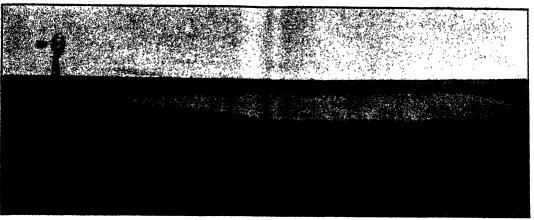
YEATTERS SHAPED OUT OF A ... THE SH WIRE METTING

CHARCOAL FILLING

LIA PRESH WIRE METTING

SECTION BB

Diagrams showing Details of Construction of Charcoal Cooler.



The Nineteen-mile Tank on the Brewarrins-Goodooga Road.

# Water Clarification in Excavated Tanks.

# A Successful Method Developed.

A. N. OLD, B.Sc.Agr., Analyst.

A METHOD of treatment recently evolved by the writer for the clarification of the waters of excavated tanks in the Brewarrina District has now been used under field conditions with completely successful results, and it is expected that the method will have a wide application. Previously it has been considered impracticable to clarify large open tanks.

In collaboration with Mr. D. R. Stark, Supervisor of Public Watering Places, Western Division, an investigation has been made of a problem of water clarification in the Brewarrina District on behalf of the Brewarrina Pastures Protection Board. The investigation was primarily concerned with the Hospital Creek Tank and the Nineteen Mile Tank, which are Public Watering Places situated respectively 9 and 19 miles from Brewarrina on the Goodooga Road. The problem, however, is general throughout the Brewarrina district, and to a less extent some other districts; its solution is expected to benefit graziers over a considerable area. The two tanks referred to are of especial importance owing to the convergence, immediately to the north, of three Travelling Stock Routes from Queensland. About 100,000 stock pass the tanks annually.

The turbidity of the untreated water is such that many thirsty mobs have refused to drink and numerous complaints have

been received from drovers. The position is aggravated by the fact that sheep coming to these tanks have usually come off bore or river water. In the vicinity of Brewarrina there are few, if any, successful bores, and surface tanks are depended on. Sheep regularly drinking the turbid water show a noticeable falling off in condition, and the large amount of mud picked up in the wool detracts from the appearance and value of the fleece.

### Causes of the Turbidity.

Unique circumstances give the surface waters of the Brewarrina and nearby districts, properties not found to the same degree elsewhere in the Western Division. The term "white water country" is often heard in this area, though the waters may be white, yellow or red in appearance.

As is well known, excavated tanks are provided with a smaller silt tank in which normally most of the silt brought down from the catchment area settles. In the cases

under review, however, most of the suspended matter is carried into the main tank, and even there settling is very slow. Desilting of tanks is sometimes carried out in other districts while there is still some water in the tank. This is impossible in the Brewarrina district owing to the fineness of



A Clay Pan, Typical of the Areas Used as Catchments.

the silt, which, when disturbed, mixes through the remaining water, forming a thin "jelly." It should be pointed out, however, that in general, desilting when dry is the preferable method in all districts

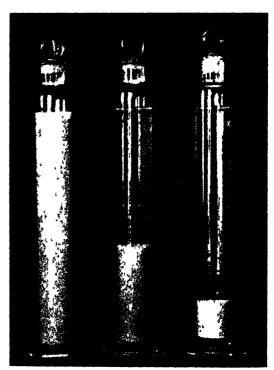
The fineness of the material in this area is due primarily to the fact that the tanks are situated in the alluvium of the old flood plains of the Darling and its tributaries, extensive clay pans being used as catchments. A striking feature of the waters is their very low content of dissolved (as opposed to suspended) mineral matter. The common salt (sodium chloride) content, for example, is only 3 or 4 grams per gallon, which is about half that of Sydney tap This property, together with the fact that the waters are alkaline in reaction. favours the continued suspension of the fine Although the clay pan soil of the catchment contains 1 per cent of salt at shallow depths, very little dissolves in the water, which quickly runs off the bare, almost impermeable surface Again, the prevalence of strong westerly winds which blow almost continuously in this district, brings dust to the catchment area, and keeps the surface of the water in constant motion The plains in this area are almost treeless, and the only protection is that afforded by the spoil banks of the tanks. It is suggested, therefore, that in the case of new

tanks, the spoil banks should be made as high as practicable, especially on the windward side.

### Laboratory Experiments.

An inspection of the tanks was made in May, 1942, and much useful information gathered from P. P. Board members, graziers and others. Samples were taken for laboratory experiments with various methods of clearing. The suspended clay particles carry like electric charges (negative), and therefore repel each other so that coagulation does not take place, but when an electric current was passed through the water, the clay particles migrated to the positive electrode and accumulated at that side of the vessel. This method, however, is probably more of academic interest than practical value.

The chemical methods tried included treatment with dilute acids—nitric, hydrochloric, sulphune and various mixtures of these



Stages in the Clarification of the Turbid Water by Salt Treatment,

--also with alumino-ferric and iron sulphate. These methods, though successful in clearing the water, were passed over on the score of high cost or practical difficulties.

### **DECEMBER 1, 1942.]**

Two methods of treatment finally selected as most suitable were:—

- (a) Treatment with saline bore or well water.
- (b) Treatment with crude salt (sodium chloride).

The treatment with bore or well water would be expensive where it was necessary to sink the bore or well specifically for the purpose; cases may rise, however, where a bore is put down in the hope of striking water but has to be abandoned owing to too great salinity. In such circumstances the method could be conveniently applied.

### The Salt Treatment.

Treatment with crude salt is recommended as the cheapest and most effective method under most conditions. In the case of the tanks treated at Brewarrina, 5 tons of salt, sufficient to bring the sodium chloride content up to about 40 grains per gallon, were added. The total cost was about £40 per tank.



A Tank in the Western District which has been De-silted by the Use of Horse Teams.

With regard to the degree of permanency of the treatment, it is important to note that much more water is lost from the tank by evaporation than by stock use. Evaporation does not remove any of the salt, so that it is necessary only to restore the salt consumed by the stock. Other sources of loss can be regarded as negligible. The presence of salt renders the water much more palatable, obscuring the alkaline taste of the soda originally present. Where stock require salt there is no wastage of the salt supplied by this method, and it may be that

if stock are to be given salt, its addition to the water is the most economical method of doing so.

### Dissolving the Salt.

The treatment of the Nineteen Mile Tank was undertaken in September, when it was almost as full as possible. The perimeter of the total water area was approximately one-fifth of a mile. As August and September are considered to be the windiest months of the year in this district, the method was tested under the most exacting conditions.

Considerable mechanical difficulty was encountered in adding the salt, but as a result of the experience gained the following method is recommended:--l'lace the bags (180 lb.) singly, every 4 or 5 yards, around the tank, just under water, with an ear of each bag protruding to indicate its position; the bags may be slid in endwise on the slippery mud surface, but care should be taken not to allow them to continue sliding to the bottom of the tank. After soaking one to three days, cut the strings of each bag and tip the remaining salt on to empty bags, spreading the salt out and placing at the water edge where the ripples will lap over it. Turn the original bags inside out, rinse, and use each as the support for the salt from the next bag until the process is complete right around the tank. With a little attention the remaining salt will dissolve in 24 to 48 hours.

This method involves the least labour, gives a good distribution and prevents the salt being mixed with the mud; furthermore, it takes advantage of windy conditions. Early in the experiment an attempt was made to overcome the action of the wind by the use of oil. This was found impracticable, as the oil was soon blown to one side of the tank. It now appears, however, that the wind is an advantage during the process of dissolving the salt, and will not interfere with the clarification once a calmaday or two has allowed settling to commence.

### The Results Achieved.

During October, the Hospital Creek Tank was treated, and an inspection of the Nineteen Mile Tank made in company with members of the Pastures Protection Board. It was decided that sufficient salt had been

(Continued on page 503.)

# THE USE AND ABUSE OF STOCK MEDICINES.

MAX HENRY, B.V.Sc., M.R.C.V.S., Chief, Division of Animal Industry.

IN the recently issued report covering the operations of the Stock Medicines Board, the following sentence appears: "The Board has consistently set its face against the practice of administering medicine to healthy animals." It is considered that the Stock Medicines Board has adopted a very sound attitude on this particular point.

In the course of time there has grown up the idea that animals require medicinal assistance in connection with normal physiological processes, even though they appear perfectly healthy. From time to time, claims are made that in order to keep animals in good condition, the administration of various drugs is necessary. If livestock—and the term includes poultry and dogs—are supplied with a suitable ration, then no medicinal assistance is required in order to enable them to maintain condition. Everything they require would be contained in one or other of the items of food supplied to them. Under exceptional circumstances, one or more of the mineral or vitamin constituents of a full ration may be lacking, but unless there is definite knowledge of the particular constituent which is not present in the food, then any medicinal treatment must be of a purely haphazard and unscientific nature

There is nothing particularly mysterious in providing an animal with the food it requires Observation of the animal itself will indicate whether it is thriving or not, and before any attempt is made to rectify any lack in the food, careful examination is necessary to determine what may be wanted. Unless this is done, the administration of any particular constituent may be entirely wasteful, and even harmful. Rectification of the diet should be the first line of action followed.

### The Use of Purgatives.

Suggestions are also frequently made that animals require purgatives from time to time as a routine matter. If an animal is properly looked after, such treatment should be entirely unnecessary. The constant administration of purgatives does not improve the tone of an animal's system, but rather tends to make the animal dependent upon the purgatives in order to obtain normal function of the bowels Animals which are deprived of sufficient exercise may often appear to require such a stimulus, but it

is far better, for the sake of the animal, to provide the exercise instead of the medicine.

There is a widespread custom of administering purgatives to normal animals at parturition. The advocates of such a procedure fail to take into consideration that millions of these animals produce young satisfactorily without the assistance of any medication, and there must be some thing abnormal in the conditions under which animals are maintained, if such a practice appears necessary.

### Purpose and Effect Must Be Understood.

It should be taken as axiomatic that, unless there is definite reason for the administration of medicine, no such administration should be undertaken. Artificial interference with physiological processes should always be looked upon as an unnecessary evil, and avoided wherever it is possible.

In abnormal conditions, such as the existence of illness, the administration of medicine is often justified and sometimes necessary, but to secure satisfactory results from such administration, the diagnosis of the condition is essential, as well as knowledge of the exact effect which will be secured by the administration of any given drug. It is considered that if stock-owners would bear these facts in mind they would benefit financially and in the health of their animals.

### Value of Improved Management.

The results brought about by correcting errors in feeding and by improvement of environment and management are likely to be permanent, but improvement brought about by the administration of drugs is generally transient, and the effects in many cases will vanish when the drug has acted. Permanent improvement by the use of drugs is only to be anticipated in the treatment of certain specific infectious and parasitic conditions, although the judicious use of medicine may assist an animal in recovering from some abnormal condition. Furthermore, improvement in diet and in environment and management will benefit not only the individual animal, but the whole herd or flock, whilst medicinal treatment benefits the animal treated only.

At times there even appears the idea that the administration of medicine can replace food, but the more completely such an idea can be eradi-

cated the better.

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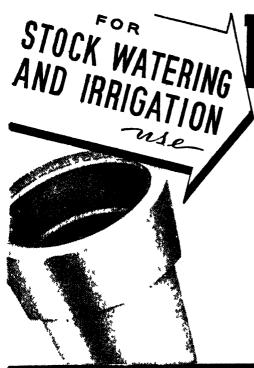
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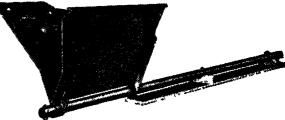
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### FEEDS and FEEDING NOTES.

# FEEDING DAIRY CATTLE.

G. L. M(CL) MONT, B.V.Sc., Veterinary Officer

Successful dairying depends largely on economical milk production, or, in other words, on cows being fed at the cheapest possible rate, but so as to produce a maximum of milk.

The first step towards such production is a working knowledge of what constitutes food, of the functions of these constituents, and of the principles of milk secretion.

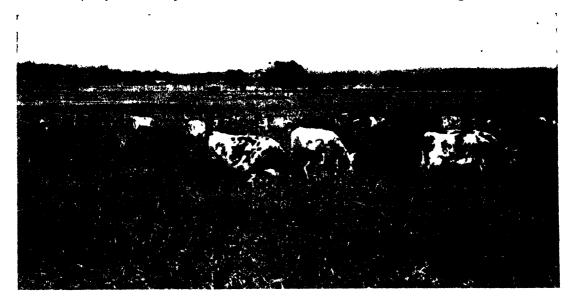
### Milk Secretion.

A common belief is that some feeds are "good milk producers" or have some stimulating effect on milk production. However, the only factors, apart from management and age, which decide the level of milk production from a cow are the inherited capacity for milk production and the

cow calves in good condition. However, body reserves are rapidly depleted and milk production soon falls if the feed is not improved. Even well-fed cattle may lose some condition at the peak of milk production, this being most noticeable with high producers. This is due to the ability to secrete milk being greater at times than the ability to consume and utilise feed. Cowshould therefore calve in good condition to meet this demand of high production.

### Composition of Feed.

On analysis a feed may be shown to be composed of protein, carbohydrate, fibre, fat, minerals, vitamins and water, the roles in nutrition of these constituents being as follows:—



provision of sufficient palatable and balanced feed. That is, no feeds or system of feeding will convert a naturally low producer into a high producer. However, young pasture appears to have a slight stimulating effect on milk production and may increase production above that obtained from dry feed.

Some feeds might appear to have a "stimulating" effect on milk production, but in practically all cases the apparent "stimulation" can be traced to the feed rectifying some deficiency of the original ration. Thus meat meal may "stimulate" milk production on a protein deficient diet, and maize may "stimulate" production when the feed contains insufficient total food matter.

The effect of insufficient or unbalanced feed may not show up immediately, especially if the

Protems.—On absorption from the digestive tract, proteins in the feed are utilised by the body for production of casein (milk protein), horns, hooves, hair, muscle, etc. Any protein in excess supply is converted to sugars to be used for fat or energy production, but fats or sugars cannot form protein. This point is important, as if a ration is low in protein the animal must drain its own body to provide protein for milk. This leads to lowered production and loss of condition. The importance of sufficient protein in a ration cannot be overestimated.

Fats.—Fats provide a concentrated source of energy (weight for weight, they will give over twice as much heat or energy as carbohydrates), and help produce butter-fat. However, their presence in feeds is of no practical importance

unless they affect the consistency of the butterfat. Thus cotton-seed and cocoanut meal, if fed in too large quantities, will tend to produce hard butter. Similarly, peanut meal, and linseed meal will tend to produce a soft butter. However, when fed in the usual amounts there is no need to consider this aspect.

Carbohydrates.—These compounds, such as sugars, starches and some celluloses, are used as a source of energy and heat, for building up fat, and for production of lactose or "milk sugar." As with fats, there is no need, from a practical viewpoint, to consider their presence in feeds.

Fibre.—Fibre has two roles in the ration—to provide the bulk necessary for efficient digestion and to provide a further source of heat and energy. High fibre content feeds, as straw, are not usually desirable on account of their low food value, and, often, high cost, but where other roughages are not available they may be used Owing to the heat expended in digesting these high fibre feeds they are of more value in winter than summer.

Minerals.—Only calcium, phosphorus and salt are ever likely to be short in New South Wales dairy cattle feed. On good pasture no innerals are likely to be lacking, but where largely handfed, 1 oz. of salt, with up to 2 oz. for high producers, and 34-11/2 oz. of dicalcic phosphate or 1-2 oz. of bone meal should be provided (dicalcic phosphate contains about one and a half times as much phosphorus as bone meal). A lick of two parts bone meal and one part salt should be given when grazing on phosphorus deficient country. Cattle heavily fed on such calcium-poor but phosphorus-rich feeds as cereal grains and by-products may require a calcium supplement, such as I oz. of ground limestone in the feed The mineral requirements of milking cattle are large, and unless supplements are provided where necessary, decreased production, loss of condition, sterility, bone chewing and limb fractures will occur.

High producers may secrete more minerals in the milk than they are able to absorb, no matter how much supplement is provided, so that the importance of an adequate dry period with good feed to allow this deficit to be corrected, cannot be overestimated.

The inclusion of iodine, copper or cobalt in licks has not been shown to be of value for cattle in this State. Until a deficiency of one or more of these minerals is proved to exist, there is no justification for their inclusion in licks or feed. The use of such materials as sulphur, iron, epsom salts, glauber salts, aniseed, fenugreek, gentian and ginger in cattle licks or feeds is unnecessary.

Vitamins.—Only Vitamin A is ever likely to be deficient for cattle. This vitamin, which is colourless, is manufactured in the body from an orange pigment, carotene, which is present in all green material and such feeds as carrots and yellow maize. In general, the greener the feed, the higher the content, though carrots are a rich source. The vitamin is essential for normal life processes.

Deficiency may cause night blindness, lowered milk yield, scouring, poor condition, nervous disorders, swollen limbs, birth of dead and feeble calves, and susceptibility of calves to "scours." Fortunately cattle are able to store enough vitamin to tide them over a period up to a year without the vitamin in their feed, but lowered intake is reflected in reduced vitamin content and colour of the milk, especially with Jerseys and Guernseys, in which breeds the orange coloured carotene is not converted to any great extent to the colourless vitamin A. (The yellow colour of the fat of these breeds is also due to carotene.)

The practical application is that cattle, when wholly handfed, should not be allowed to go longer than, say, six months without a period of feeding on some greenstuff as pasture or good lucerne chaff. Maize, maize gluten and hominy meal also have a fair content of carotene, and can be used where green feed is difficult to obtain.

### Food Values at a Glance.

The complete analysis of a feed is too unwieldy for general use, so taking into account digestibility, energy used in digesting the food, fattening capacity, and ability to produce protein in the body, two simple figures are arrived at.

The first is the starch equivalent. This figure takes all the above factors into consideration and expresses the number of pounds of starch required to replace 100 lb of the feed in its ability to produce energy or fat. The protein is also considered as being entirely used for fat or energy production. Thus the starch equivalent of maize is 78, and of straw 20. That is 100 lb, of maize and 100 lb, of straw are equivalent to 78 and 20 lb, of starch, respectively, in their ability to produce fat or energy. It is evident that  $\frac{100}{20}$ , or 5 lb, of straw contain "1 lb, of starch equivalent" which will be referred to fo brevity as 1 starch unit.

The second figure is the protein equivalent. This is arrived at by considering the ability of all protein or protein-like material in the feed to produce protein in the body, so that a protein equivalent value of 8 for oats indicates that 100 lb. of oats contains protein material equivalent to 8 lb. of wholly digestible pure protein, i.e., 8 protein units.

### Feed Defined.

Using these terms it is possible to define the various classes of fodder.

A Roughage is a feed which, either on account of a high content of indigestible matter or a high content of water, or both, contains comparatively few, usually less than 40, starch units per 100 lb., and is of a bulky nature. Hays, chaffs, silages, roots, crops and pasture fall into this group.

Starchy Concentrates are those feeds with a high feeding value, usually over 65 starch units per 100 lb., but with comparatively low protein content, the ratio of starch to protein units being usually from 7 to 1 to 15 to 1.

Protein Concentrates are those feeds which, like starch concentrates, have a high total feeding value with usually over 65 starch units per 100 lb.,

but have a ratio of starch to protein units of anything from I to I to 4 to I, i.e., with more than 20 protein units per 100 lb.

Self-balanced Feeds are concentrates with a ratio of starch to protein units of 5 to 1, i.e., with starch and protein units in the same ratio that is required in concentrates for milk production. Accordingly, they do not need "balancing" or mixing with other feeds.

### Feeding Standards.

Experiments have enabled the food requirements for dairy cattle to be stated in amounts of starch and protein units required for maintenance and production. Maintenance requirements are the nutriments necessary for maintenance of a cow in average milking condition without increase or decrease in weight. Production requirements are the extra nutriments that must be added to allow of the production of milk without drawing on body reserves.

These feeding standards, as they are called, may be a little generous for some cows and slightly low for others, but on the average they give a remarkably accurate representation of the requirements of cattle. However, their use should not obscure the realisation that cows are living animals, not milk producing machines, and as such have individual peculiarities and likes and dislikes.

The requirements for maintaining cattles of different weights are as follows:—

Maintenance Requirements of Cattle

Weight of cow.	Starch Units.	Protein Units
1b	THE RESERVE OF THE PERSON OF T	
600	4.2	0.38
700	4.7	0.42
800	5.1	0.48
900	5.2	0.54
1000	0.0	0.6
1100	6.4	0.65
1200	6.8	0.71

As the protein and lactose content of milk increases with the fat percentage, the larger demand for food material for the production of rich milk is easily understood and is noticeable in the following table:—

Food Requirements for Production of 1 gullon of Milk.

Fat Content of Milk.	Starch Units.	Protein Units.	
THE Exchipmental a dispusant region .	ng agreement records	and appears programs	
Per cent.		!	
3.53.8	2.5	0.50	
3.94.0	2.6	0.52	
4.1-4.3	2.75	0.55	
4.4-4.6	2.9	0.57	
4.74.9	3.0	ი ი ი	
5.05.1	3.1	0.62	
5.25.4	3.25	0.65	

The protein units in these standards are a minimum, and when working out rations, it is always advisable to allow a little extra protein to make up for possible variations in the protein content of some feeds.

The average weight of dairy breeds and the average fat content of their milk are as follows, but the variation from these averages is very wide.

Live-weight and Butter-fat Content of Milk of Cattle Breeds.

Breed.			Average Liveweight.	Average Butterfat Content
	-	1		
		1	1b	Per cent.
]ersey			გიი	5.2
Guernsey			950	4.9
Ayrshire			1,000	4.0
Australian	Illa	arra		
Shorthorn		•••	1,000	3.8
Red Poll			1,100	3.7
Friesian	• • •	•	1,200	3'4
		1		i

### Preparation of the Ration.

These feeding standards are valueless without consideration of practical points involved in feeding, and in preparing rations, consideration should be given to the following items:—

Capacity—Cows can eat only a limited quantity of food. Average cows of, say, 1,000 lb. weight will consume up to 33 lb. of dry feed (i.e., grains, hay, chaff, etc.) daily, equivalent to about 150 lb. of pasture, if the feed is of sufficient palatability, and this figure may be varied up or down depending on the size of the cattle Palatability of the feed, weather conditions and the individuality of the cow also have a bearing on capacity. In general 4 lb. of green feed, moist slage, and root crops, or 3 lb. of drier silage will equal 1 lb. of dry food, such as grains, chaffs, etc.

When calculating the dry matter in a ration, add the weights of all dry foods—grains, meals, hays, chaffs, etc.—divide silage weights by 3 or 4, depending on whether low or high moisture content, green crops by 4, and add. Thus in a ration such as 30 lb. of silage, 10 lb. of hay and 6 lb of concentrates, the total dry food is  $\frac{3}{9} + 10 + 6 = 26$  lb.; this is quite a practical ration—the average cow has the ability to eat it.

Palatability.—Unpalatability, which may be due to novelty of the feed, dustiness, or unattractive taste or consistency will reflect in lowered feed consumption, and hence lowered production. Measures for increasing the palatability of feeds are as follows, but should not be used to increase consumption of material of very low food value.

- (a) Moistening with diluted molasses. This should be discontinued when the cattle have been brought on to the new feed, unless the molasses is cheap on a starch unit basis, since the molasses may reduce the digestibility of fibre.
- (b) Moistening with water. This will not increase, and may even decrease digestibility, but it will make some dusty or gritty feeds more palatable. Mixing dusty chaff with silage will achieve the same end.

- (c) Gradual Introduction.—Suddenly giving a full feed of some new material will often cause cows to go off feed, but if it is only given in small amounts at first, and the amounts gradually increased, usually no trouble is experienced. This is sometimes noticed with meat meals.
- (d) Improving the Texture.—Too great a quantity of such heavy "mealy" feeds as crushed wheat, maize, or barley will tend to make a ration unpalatable, and such leavening or bulky concentrates as bran or crushed oats should be included in these cases.

Variety.—Variety in a ration, that is, using a mixture in preference to single feeds, is a potent factor in keeping a cow "interested" in the feed and, in general, mixtures of feeds will give better results than single feeds. However, good results can be obtained from roughages and single concentrates.

Effect on Digestive System.—Dry roughages as straw, coarse pasture, and scrub may cause constipation. Young pasture, bran and linseed meal are laxative in their action. Excessively laxative or constipating rations may tend to reduce milk production, but a mildly laxative ration which keeps the dung of normal consistency is preferable to those with a binding tendency.

Effect on Dairy Products.—Feed flavours are produced by strong smelling or tasting materials being absorbed from food in the gut and exercted in the milk. As this process will usually only last for a few hours after the food has been eaten, feeding such materials immediately after milking will usually leave no taint at the next milking. Cabbage, turnips, onions, garlic, rape kale, lucerne, clover, silage and carrot weed are the commonest materials to be watched in this respect. The absorption of feed odours from the air is very rarely to blame for tainted milk

Preparation of the Feeds.—Roughages such as cereal hays and straws should, wherever possible, be chaffed, as up to twice as much energy may be used digesting hay as against chaff. However, with lucerne, clover and grass hays there is little or no difference. Grains (wheat, maize and barley) should be coarsely crushed and wheat and oats may be rolled. This not only increases palatability, but also efficiency of digestion. Fine grinding is to be avoided as, especially with wheat, an objectionable pasty mass is likely to be produced in the mouth and digestion may be upset.

General Management of the Herd.—It is uscless feeding cattle well if the other points of general management are overlooked. As a prominent American agriculturalist once commented, "A gentle voice and a caressing touch are quite as potent as digestible protein." No truer words could be spoken. Rugging in cold weather, provision of shelter, adequate water supply, gentle management, regular feeding, efficient and regular milking, an adequate dry period with good feed, hygienic measures, all are complementary to good feeding

### Feed and Production Costs.

Which are the cheapest feeds? Feeding costs are usually a high proportion of total production costs (over 60 per cent. when hand feeding), and

it is the keeping of feeding costs at a minimum whilst keeping production at a maximum that spells the difference between profit and loss.

As economic feeding is, if one considers it for a moment, a question of supplying the cheapest possible sources of starch and protein units, the cost of the units may be used for determining the cheapest foods,

The method of calculating the costs of these units is simple, as the following will show:—

Pollard contains 65 starch units per 100 lb.

It costs 6s. per 100 lb.

Therefore 65 starch units cost 6s.

And so I starch unit costs 6s.

That is, about i.id.

Wheat contains 44 starch units per bushel.

Therefore 44 starch units cost 3s. 8d.

And so I starch unit costs 6s.

That is, about i.id.

Thus with pollard at £6 per ton and wheat at 3s. &d. per bushel (including cost of crushing) wheat is the cheaper feed by about 10 per cent.

As a further example, maize may be available at 5s 6d. per bushel, which, with crushing cost, will bring it to about 5s. 9d.; oats may be available at 3s. 2d. which, with crushing cost, will bring it to 3s. 5d., and crushed oats may be available at 10s 6d. per 100 lb.

Cost of starch unit in maize is  $\frac{55. \text{ od}}{44}$ 

(44 starch units in 1 bushel of maize), i.e., about

Cost of starch unit in oats,  $\frac{35-50}{25}$ 

(25 starch units in 1 bushel of oats), 1 e, about 1.6d

Cost of starch units in crushed oats  $\frac{108}{63}$  6d (63 starch units in 100 lb. of oats), i.e., 2d

In this case, therefore, it will not pay to buy outs already crushed, and it is a question of deciding between maize and outs. If green feed were short, the Vitamin A in maize might be a deciding factor, but if green feed were available, the ease with which crushed outs is fed and the palatability of it for cattle would probably indicate that it was the better purchase.

Protein-rich feeds are compared on the cost of protein units. Thus peanut meal may be available at 7s 6d per 100 lb. and linseed meal at 9s. per 100 lb.

Peanut nical contains 43 protein units per 100 lb.

It costs 7s. 6d per 100 lb
Therefore 43 protein units cost 7s. 6d.
And so 1 protein unit costs 7s. 6d.

And so 1 protein unit costs 7s. 6d.

Therefore 25 protein unit costs 7s. 6d.

And so 1 protein unit costs 9s.

And so 1 protein unit costs 9s.

That is, about 2 id.

Thus at these prices linseed meal is about twice as dear as a protein supplement.

In some cases protein-rich feeds are as cheap on a starch unit basis as starch-rich feeds, so that the economy of purchasing them in these cases is obvious. Thus peanut meal, containing 43 protein units per 100 lb. is commonly available at £6 10s. per ton, i.e., about 1-1d. per starch unit.

The self-balanced feeds, for example bran and cocoanut meal, are compared among themselves on a starch unit basis. Thus bran and cocoanut meal would be compared with each other by comparing cost of starch units.

### Further Applications of Costing.

Working on the ruling average costs of starch units in various types of feed, as given below, many every-day problems of the dairy farmer can be solved.

Average Ruling Cost of Starch Units in Feed Types.

2 ) 100.	
Pasture	$1_{0}^{1}\mathbf{d} - 1_{0}^{1}\mathbf{d}$ .
Home-grown roughage (silage and hav)	
(hay produced at 35s. per ton and	
silage at 11s. per ton).	
Bought roughage (hay at £4 and £10	
per ton)	1 <b>[</b> d3d
Home-grown concentrates (wheat,	•
maize, sorghum, grain, oats)	ld.—rd
Bought concentrates	id 4d

### ROUGHAGE AND COST OF MILK PRODUCTION.

Cheap roughage is essential for cheap milk production. Consider two cases where 16 lb. of hay are being used as the maintenance part of the ration; assume in one case that it is home-produced and in the other that it is bought at £8 per ton

Cost of r starch unit in home grown hay	₽d.	Cost of starch unit in have bought at \$\int 8\$ per ton	2·4d.
Starch umts m 16 lb hay	6	Statch units in 16 lb. hay	b
Cost of 6 starch units		Cost of 6 starch units	I 2}
That is, cost of mainten- ance part of ration is	<b>3</b> d	That is, cost of mainten- ance part of ration .	1/21

In this example there is a difference of 11½d, in the cost of only maintaining a cow when homegrown roughage is compared with bought roughage, and it will be even more where hay or chaff rises to the not-unknown prices of £10 to £12 per ton.

The effect of the cost of roughage on the cost of milk production, and the necessity for cheap roughage if milk is to be produced cheaply, are obvious

Concentrates usually cost about id. to rad, per starch unit, so that to reduce the cost of production when roughage is bought, cattle should be fed a minimum of roughages and a maximum of concentrates.

As a rough guide, where hays or chafts are more than £5 10s. per ton, they are dearer feeds than concentrates and should be reduced to a minimum of 10-12 lb. and concentrates used to make up the nutritive requirements.

### DOES IT PAY TO FEED THE LOW PRODUCERS?

The question often arises as to whether certain cows merit retention in the herd; that is, as to whether they are "paying their way."

Consider a case where oaten chaff is £5 10s. per ton (about 1½d. per starch unit) and concentrates cost about 1d. per starch unit (wheat at 3s. 8d., oats at 2s., peanut meal at £0 10s. per ton). Allow 16 lb. of chaff (that is, 6 starch units) as a maintenance ration.

Daily Pro- duction from Cow.	Cost of maintenance part of ration. (6 starch units at 11d. per unit.)	Cost of production part of ration. (2.5 starch units at 1d. per unit.)	Total Cost.	Cost of feed per gall.
gal. 1 2 3 5	d. 9 9 9	5. d. 0 2½ 0 5 0 7k I 0½	s. d. o 111 1 2 1 41 1 91	d. 111 7 54 41

The high cost of production from low producers and the low cost of production from high producers is evident. The waste entailed in overfeeding low producers and underfeeding the high producers needs no comment.

### DOES IT PAY TO BUY SUPPLEMENTARY FEED ?

Buying of concentrates to supplement homegrown roughages usually pays.

Say that home-produced roughage is enabling an average production of 2 gallons. Nutriment required for an additional gallon of milk is 2.5 starch units (containing 0.5 protein units).

Cost of starch units ... ... 11d.

Cost of nutriment for additional gallon of milk

is 11d. × 2.5, which is ... ... ... ... ... ... 31d.

That is, to buy the extra supplementary feed which will allow cattle to produce another gallon of nulk costs only, on the average, about 3 d.

WHICH IS CHEAPER, A MIXTURE OR A SINGLE FEED?
The problem sometimes arises as to whether it is cheaper to buy a self-balanced feed, or mix starch and protein concentrates to give a mixture balanced for milk production.

Cocoanut meal (a self-balanced feed) may be available at 1.2d. per starch unit, linseed meal at 1.7d. per starch unit and maize at 1d. per starch unit. Is it cheaper to use cocoanut meal alone, or a mixture of maize and linseed meal?

A mixture of three parts linseed meal and four parts maize makes a balanced mixture.

Starch units in 3 lb. of linseed meal ... ... 2.2 Cost of these starch units at 17d. per unit

15 about ... ... ... ... ... ... ... ... ... 3.7d.
Starch units in 4 lb. of maize ... ... ... ... 3.1
Cost of these starch units at 1d. per unit is ... 3.1d.
Total starch units in mixture ... ... 5.3
Total cost of starch units in mixture 6.8d.

Cost of starch unit in mixture ... 1.3d.

The cost of one starch unit in cocoanut meal is 1.2d.; therefore in this case it is the cheaper feed.

(To be continued.)

### Current Food Unit Costs.

THERE has been little alteration in the feed position as regards price or supply, though, as is only to be expected as the new season's crop of oaten, wheaten and lucerne chaffs and hays have come to the market, there has been a fall in prices of these products.

Oaten and wheaten have are the best buying in roughages, but in cases where the difference

in cost between the hays and chaffs is small and it is intended to chaff the hays, it will be probably more economic to buy chaff.

The roughage costs quoted in the table are the average, at the time of writing, of costs quoted at Alexandria, and so are only directly applicable in the vicinity of Sydney. However, they give an indication of the trend of roughage values and a comparison of the cost of concentrates.

It is realised that this food unit scheme of valuing fodders has certain weaknesses; the greatest of these in this country of distances is the great effect that freight costs have on the ultimate costs of food to the stockowner. However, many of the foods, especially grain byproducts, oil meals, and animal by-products are largely prepared in Sydney so that freight costs to any point will be about equal

Stockowners should, however, appreciate the wisdom of buying the more concentrated types

of foods; that is, foods with a high food value is compared with their weight. The cost of freight for a given weight, is about equal, no matter what the food value of the food. Thus, the freight on 100 lb of crushed oats and 100 lb. of crushed maize will be about equal, but in one case 62 starch units are being carried and in the other 78 starch units. That is, the cost per starch unit occasioned by freight is less the more concentrated is the feed. Where freight costs are different for two feeds, it is necessary to calculate the cost per ton landed on the property, and to work out the food unit costs.

Гсеd	Starch Protein Units per Units per 100 lb		Cost pe Starch Unit		Cost per Protein Unit	Remarks
	_	-	Roughages.	-		and the constitution.
Lucerne Hay or Chaff (Good sound)	35 45 (average quality 40)	9	£7 108 to f9 long ton*	2d 2 4d		A fall in price since last month.  New season cereal hay appears to be the best buying in
New Season Wheaten Hay	33	3	£5 ros to £6 long			roughages, but grains are still indicated as main part
New Season Oaten Hay	33	3	£5 104 long ton*	16d ~18d		of the rations wherever
Wheaten Chaff (Good sound)	40	3	£6 10s -£7 long ton*	1 7d -2d		Mostly dearer than hays but wheaten chaff is sometimes
Oaten Chaff. (Good sound).	40	3	£8 long ton*	2 1d		better buying.
Oaten Straw New Season Wheaten	20	0.6	£7 long ton* £4 105 long ton*	3 Sd 3 2d		Straws too dear for feed
Straw	14				1	
Oat Hulls	21	0 5	1 13 135 long ton*	1 9d	1	roughage
Rice Hulls	3	υʒ				Not worth buying as feed at any
			Starchy Concentr	ates		
Maize Maize Mcal	78 78	8	55 bushel £14 to £15 short ton†	1 9d 2 2d —2 3d		In expensive for feed purposes. An expensive meal at present prices
W heat	72	4	35 6d bushel	1d 1 2d		Wheat and bailey are both cheap feeds Will probably pay to
Wheat Meal Barley	72 71	ა 7	f7 to f7 ros short ton† 3s bushel	1 2 d		crush own grain if possible
Barley Meal	71	7	£7 55 short ton†	rid	i i	instead of buying it as a meal
Oats Crushed Oats	62	8	35 2d bushel 35 9d to 45 per 40 lb	15d 18d 19d	1	More expensive than wheat or barley.
Dat Bran	46	4	£5 5s short ton	1 4d	1	A bulky feed, supplies limited
Wheat Bran	55	10	£6 short ton	1 3d		Bran worth buying when available for use as part of dairy and poultry rations to im- prove the texture
Wheat Pollud	66	10	£6 short ton+	1 1d		Pollard good buying when
Hominy Meal Rice Meal	79 72	4 0.5	£18 long ton*	2 5d		An expensive feed at this price None available
Rice Mean Rice Pollard	72	7			1	None available.
Molasses	50	í	£3 105 — 44 gallon drum (515 lb)	3 311		Supplies short Only worth buying for drought use
			Protein Concentr	ales		
Meat Meal (60 per ccut. erude protein)	80	55	fio ios short ton†		2 3d	Supplies available, but not extensive. Should only be used for pig and poultry industry.
Blood Meal	66	t7	£14 short tont		2 5d	Supplies available
Liver Meal	94	5 <b>B</b>	£14 108, short tout		30	Supplies available
Fish Meal (60 per cent	59	5.3	•			None available
crude protein) Linseed Meal	72	25	fg 105 to f10 108 short	1 6d - 1 7d	4 5d 5d	Stocks will stand increased demands.
Peanut Meal	78	43	£6 10s short ton†	1 1 <b>d</b>	1 8d	Supplies available, and the cheapest protein concentrate.
Cocoanut Meal Maize Gluten	76 78	16 20	f7 ros short ton†	1 2d. 1 4d.	5.7d 5.4d	Supplies short and sales limited Supplies limited

I'ROM time to time, claims are made regarding various methods of controlling the sex in animal breeding. Before attempting to secure such con-

\* I ong ton = 2,240 lb

trol, it is suggested that stockowners should seek professional advice or an opinion from the Department of Agriculture.

† Short ton = 2,000 lb.

# A Letter to CHEVROLET...

### PRATT & WHITNEY AIRCRAFT

DIVISION OF UNITED AIRCRAFT CORPORATION EAST HARTFORD CONNECTICUT USA CABLE ADDRESS AIRCHAFT

Mr. M. E. Coyle, General Manager Chevrolet Motor Division General Motors Corporation Detroit, Michigan.

Dear Mr. Coyle:

Our liaison engineer tells me that Pratt & Whitney engines were rolling off your assembly line with increasing speed during the month of May - just ten months after we first discussed the possibility of Chevrolet manufacturing these engines under license. This is a record which we believe has not been equalled and we offer our sincere congratulations on your outstanding achievement.

The writing of such a brilliant chapter in the war effort is a tribute to the enthusiasm, open-mindedness and competence with which Chevrolet tackled the job and is seeing it through.

I speak for our whole organization when I tell you that we are proud to have Chevrolet teamed up with us in this vital task.

Horner General Manager

June 6, 1942

Consistent, whole-hearted teamwork between Pratt & Whitney

and Chevrolet has made possible the production record referred to in the letter reproduced above. In Australia too, the men and women who are General Motors-Holden's, working as a team with many able and efficient independent manufacturers and suppliers, are producing — in several instances in record time — an ever-widening range of war

Victory is our Business

GENERAL MOTORS—HOLDEN'S Melbourne

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LTD. Perth

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INVEST YOUR SAVINGS NOW FOR FULL ENJOYMENT AFTER VICTORY

Money spent to-day on non-essentials is irretrievably gone—money saved and invested in Australia's war effort is yours to spend as you please in the post-war years. Meanwhile there can be no better use for it than applying it to the needs of the war effort—a sound investment to help Australia win the war and to help you to enjoy the years of peace.

SAVE . . . AND INVEST ALL YOU CAN IN THE £100,000,000

# AUSTERITY LOAN

Bonds are £10 each and in multiples of £10. Two kinds of Bonds are available:—

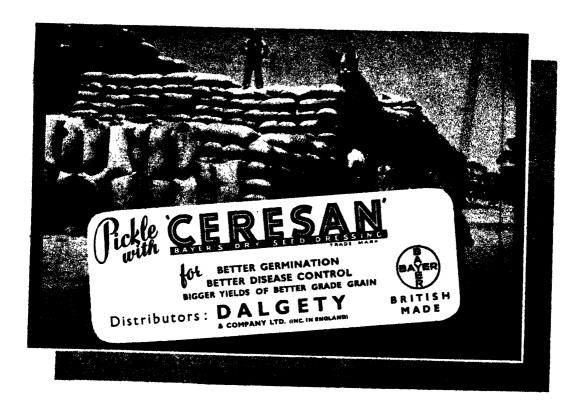
- 1. 2½% interest a year—redeemable 1947.
- 2. 31% interest a year—redeemable 1958. You can pay for your Bonds outright or by instalments.



Bonds are realizable in case of need. Buy Bonds from any Bank, Savings Bank, Stockbroker or Money Order Post Office.

Convert:—Holders of Stock or Bonds maturing Dec. 15th, 1942, may convert them into Austerity Bonds or Stock.

AL 52-M3



# INSECT PESTS.

Notes contributed by the Entomological branch.







#### FRUIT FLIES.

(Trypetidae.)

# Alteration to Regulations.

MEASURES for the control of fruit flies are compulsory, under the Plant Diseases Act. These compulsory measures now comprise the use of foliage poison sprays and the regular destruction of all infested and fallen fruits. Trapping has been discontinued under the Regulations and the use of glass fly traps, therefore, does not now comply with the Act.

The formulae for the foliage poison baits now prescribed are:—

( <i>a</i> )	Sodium fluosilicate White sugar	21/2 lb
	Water	4 gations
	or	
(b)	Tartar emetic	2 07,
	White sugar	2™ (lb
	Water	

The sodium fluosilicate should be dissolved in practically the full quantity of water required. A vigorous stirring for about five minutes is necessary as the powder falls to the bottom of the container. Although sodium fluosilicate is more readily soluble in warm water, the quantity of water required is not appreciably less than when cold water is used. Tartar emetic is readily soluble, and has been proved to be at least twice as efficient as sodium fluosilicate in killing the flies and is less likely to injure the foliage.

#### To Prepare Small Quantities.

Where only a few trees have to be baited, the following procedure will be found useful:—Dissolve I oz. of the poison in I gallon of water to make a stock poison solution. This solution should be stored in a glass container, corked securely and labelled "POISON." When required for use take:

I pint of stock solution, add

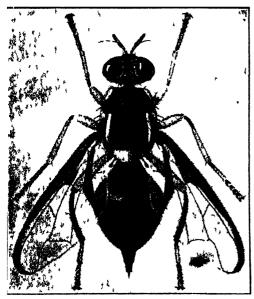
I pint of water, and

21/2 ounces of sugar.

The quart of poison spray thus prepared will be sufficient to treat four to six trees, and the stock solution should suffice for the season's requirements for the average household orchard.

#### Application of the Poison Spray.

The treatment of the trees must commence at least five weeks before the normal time of the ripening of that particular variety of fruit, and the spray should be applied at weekly intervals until all fruit of that variety has been harvested or removed from the trees. In the case of the last variety to be harvested, the treatment must be continued for one month after all the fruit has been removed. On citrus trees the spray should be applied during the period of fly activity.



The Queensland Fruit Fly

The spray is applied to two or more patches of the foliage and at the rate of at least 6 fluid ounces to each tree. A pump or syringe may be used, but splashing with a large brush is also effective. Care should be taken, as far as possible, to avoid wetting or splashing the fruit. If rain falls soon after the application of the bait a second treatment should be given.

#### Destruction of Infested and Fallen Fruit.

All infested fruit (including tomatoes) must be removed from the trees and plants and all fallen fruit (including tomatoes) must be collected from the ground at intervals not exceeding three days. All such fruit must be destroyed without delay, either by boiling for at least ten minutes, or by burning or placing in a properly constructed fly-proof waste-fruit pit

#### Other Compulsory Measures.

Other compulsory measures set out in the proclamation, for areas specified in the Schedule, are —All fruits of the main crop of Seville oranges, various varieties of mandarins and loquats must be removed from the trees by 31st October—In the same areas the intermediate crop of Seville oranges must be removed by 31st December. Elsewhere in the State the date specified is 15th December.

# Snails, Slugs and Slaters (or Wood-lice).

THESE pests thrive best under moist conditions, and following the recent rains, they have again appeared in considerable numbers

Snails and slugs feed on weeds as well as cultivated plants. It is essential, therefore, first to remove weed growth that is adjacent to cultivated areas and any accumulated rubbish or other material under which the pests may be able to shelter, as a preparatory control measure.

On small areas, snails and slugs may be "hand-collected" and destroyed, but on large areas and where they are present in great numbers, they are best controlled by the use of poisoned baits or by spraying or dusting the plants with a poison.

A poison bait recommended may be prepared according to the following formula:—

Calcium arsenate . I oz.

Bran . . . . I lb.

(upproximately 9 healflust cups.)

Water . . . . I pint.

The calcium arsenate and bran are mixed thoroughly while dry, and then made into a crumbly mash with the water. The bait is scattered in a thin layer on the soil along the rows of affected plants and in other places where the snails and slugs are known to congregate. The bait is best applied late in the afternoon or at night to ensure that it remains moist, as it is unattractive in a dry condition. The snails

may not be killed in appreciable numbers for two or three days.

Another bait recommended consists of metaldehyde and bran. Metaldehyde is not available in New South Wales, but solid fuel tablets, which contain a high percentage of metaldehyde, may be used as a substitute. The formula is:—

Solid fuel tablets (containing metaldehyde) 3 tablets
Bran ...... 1 lb.
Water ..... 1 pint

The tablets are ground to a fine powder and mixed thoroughly with the bran. The water is then added to make a crumbly mash. This poison bait is placed (prefer-



The Common Garden Snail.

ably early in the evening) in small pellets in parts of the garden where the pests are known to be present. They are attracted to the bait, and after feeding become paralysed and eventually die in the vicinity.

Spraying the affected plants with arsenate of lead at the rate of:

Arsenate of lead powder .... 3 oz.

Water ..... 5 gallons
or dusting the plants with a mixture consisting of:

Arsenate of lead powder ... 4 oz. Hydrated lime ...... 1 lb. will also control them.

Lime and tobacco dust is useful for protecting young seedlings from snails and slugs if scattered in a ring around the plants. Either slaked lime or finely pulverised salt, dusted liberally in the haunts of the slugs is effective, temporarily.

In some areas, snails damage the fruit and foliage of citrus trees, and it has been found that Bordeaux sprayed trees suffer very little injury from these pests. The Bordeaux sprays have a repellent action and this is particularly noticeable where oil is combined with them.

Slaters may feed on the foliage of many plants. They are particularly fond of seedlings, and these may be damaged both in the seed-bed, and during the first week or so after transplanting while their growth is at a standstill. Much of the damage attributed to snails and slugs may be due to slaters. They feed at night and shelter by day in moist situations, beneath seed-boxes or under debris, etc. Ornamental plants, such as staghorns, etc., are very liable to attack as they provide both suitable food and breeding places amongst the fronds.

On ornamental or delicate foliaged plants a dust mixture consisting of:

Pyrethrum powder ...... 4 oz. Kaolin or flour ...... 1 lb. may be used to control them.

An effective poison bait for slaters consists of:

Paris green . . . . 1 oz Rice flour . . . . . 2 lb.

These two substances should be mixed together, dry and then dusted lightly throughout the garden (preferably by means of a hand duster), particular care being given to the places where the slaters are found to be congregating, such as under creepers and shrubs, seed-boxes, etc. Avoid dusting plants with this mixture, as the Paris green may cause foliage injury.

## Rutherglen Bug.

(Nysius sp.)

DURING the past month reports have been received that Rutherglen bugs have become abundant in various districts.

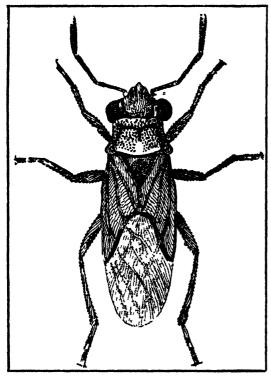
These insects first appear in grasslands and amongst weeds where they have developed, and in seasons particularly favourable for their development may occur in enormous numbers and become a serious pest. They increase and spread during the

early summer to field crops and vegetables such as potatoes, beans, tomatoes, etc., and as they also attack orchard trees, they may become pests of stone fruits during midsummer.

The younger growth of the terminal shoots of the plants is first attacked, and the effect of great numbers of these small bugs sucking the sap causes drooping and

wilting of the foliage, and in some instances total destruction of the plants. When peaches, apricots, cherries, etc., are infested they may become so pitted and disfigured by exudations of gum that they are spoiled both as fresh or canning fruit.

Infestations frequently occur during dry warm weather when the water content of the soil is low. The plant roots are then unable to obtain sufficient moisture to replace that which is lost in the form of sap from the leaves and serious injury to the plants results.



Adult of the Rutherglen Bug.

#### Description and Life-history.

The adult female bug, which measures about one-fifth of an inch in length, is narrow-bodied and of a general greyish-yellow colour, with darker brown markings. The upper surface of the head and thorax is covered with large "pits" and numerous small hairs. The eyes are black and prominent; the antennae are four-segmented and two small ocelli (simple eyes) are to be seen on the top of the head. Two pairs of wings are present, and these are folded flat over the back when the bug

is at rest. The beak or rostrum is long and is held horizontally beneath the body when in repose. The male is smaller than the female and somewhat darker coloured. The adults crawl actively, but fly quickly when disturbed, their movements suggesting those of small flies.

The eggs, which measure about one-twenty-fifth of an inch in length, are creamy-white when first laid, but become reddish-brown before hatching. They are laid on weeds, and when deposited on sow thistle (Sonchus oleraceus), the site selected is the silk-like portion of the mature flower head. The eggs are placed in compact groups of from two to seven, and during the summer the incubation period is about six days. More than four hundred eggs may be laid by an individual female.

The young nymphal bugs grow by a series of moults, and cast their skins five times before reaching their winged adult stage. The length of the life-cycle from egg to adult is about four weeks.

#### Control.

As the bugs, in both their nymphal and adult stages, feed by sucking up the sap, they cannot be poisoned like leaf-eating insects by means of arsenical or stomach poisons.

Vegetable Crops - Control may be obtained by spraying with a kerosene-pyrethrum emulsion. This spray is prepared by steeping overnight 1 lb. of pyrethrum powder in 1 gallon of kerosene, and then making up the extract (which should first be strained through muslin) in the manner usually practised for kerosene emulsion. This may be done by dissolving 1/2 lb. hard soap in 1 gallon of heated water and then stirring in and thoroughly emulsifying the gallon of kerosene-pyrethrum extract to form a stock solution. For use the 2 gallons of stock solution is diluted with water to make 40 gallons of spray (1 pint of stock solution to make 21/2 gallons).

The following dusts may be used to control the bugs:—

- (1) Pyrethum powder mixed with an equal quantity of 2½ per cent. nicotine dust. This dust should only be mixed just before use.
- (2) Pyrethrum powder mixed with an equal quantity of either kaolin or talc.
- (3) Nicotine dust 21/2 per cent.

In crops such as potatoes the numbers of bugs may be considerably reduced by brushing them into a shallow trough drawn through the rows. Water and oil or thin tar is poured into the bottom of the trough, which should be about 6 feet long and about 2 feet wide, and as it is drawn through the rows, an operator following behind brushes the bugs into it by sweeping the plants with a small leafy branch of a tree or bundle of brush. This procedure should be followed for several consecutive days.

Fruit Trees.—Where fruit trees are infested they may be dusted with one of the dusts previously mentioned, or else they may be sprayed with a pyrethrum-soap solution of the following proportions:

Pyrethrum powder .. 1½ lb. Soft soap ...... 1½ lb. Water ...... 40 gals.

This mixture should not be allowed to stand. If the pyrethrum-kerosene emulsion is used on peach trees there is some risk that it may cause scorching of the foliage.

Smudging may be practised to drive the winged bugs away. The smudge fire may be made by burning heaps of semi-dry weeds, etc., that give off a pungent smoke, which causes the bugs to fly from the trees as the smoke passes along the infested rows. The smudge fire may be placed on top of a sledge or in an iron tank and drawn through the rows of trees, stopping a few minutes at each tree. The sledge

should be driven at right angles to the wind and worked systematically along the rows from the windward side of the block of trees. Smudging only temporarily prevents an infestation, but it may delay it for several days and in some circumstances may prove useful in permitting fruit to be picked before it becomes seriously damaged.

General.—A method adopted to prevent the bugs from crawling into cultivated areas is to construct a furrow with a vertical side nearest the crop. The bugs crawl or fall into the furrow, and if holes, about I foot in depth, are dug in the bottom at intervals of about 15 feet, the bugs collect in them and may be readily destroyed by spraying with a crude oil emulsion or kerosene-pyrethrum emulsion or may be dusted with one of the dusts previously recommended. Many of the winged bugs may also be trapped in the furrow.

Hydrated lime and tobacco dust may act as temporary deterrents.

Another means of deterring the bugs, where they are crawling into cultivated areas, is to spray a band of crude creosote oil or wood-preserving oil or thin tar along the ground on the edge of the area.

It is impossible to prevent the active adult winged bugs from entering crops except, perhaps, by a smoke screen from a smudge fire.

As the bugs breed amongst various weeds, clean cultivation is also an important factor in their control.

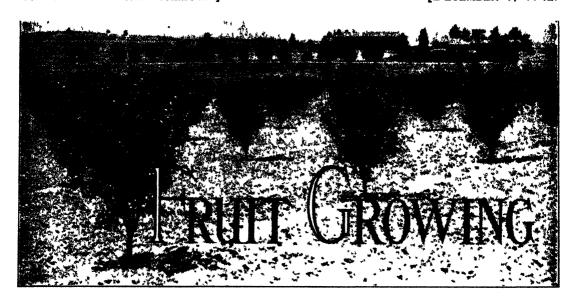
### Water Clarification in Excavated Tanks.

(Concluded from page 551.)

added, the water being eminently suitable for stock. Although it is possible to make the water quite clear by this method, it is considered preferable to maintain it in a slightly milky condition to inhibit the growth of algae and other aquatic plants.

Several mobs of sheep and cattle were passing the tank at the time of the inspection, and the drovers were unanimous in their opinion that the water was now perfectly satisfactory for their stock and also suitable for human consumption.





# The After-care of Buds and Grafts.

H. Broadfoot (Incf Fruit Inspector, and E (WHILLAKER, Fruit Packing Instructor.

WHEN working over established trees it sometimes happens that the results to be expected from an excellent "take" of buds and grafts are considerably impaired by the treatment the stock and growth receive later, but if the methods of after-care indicated below are adopted these losses will be reduced.

#### Cut Budded Stock to a Stub.

When the natural buds of the stock show signs of activity in the spring, shoots that were budded during the previous growing period should be cut back to start the inserted buds into growth. Generally this cut should be made between 2 and 3 inches above the inserted bud, leaving a stub to which the tender shoot from the inserted bud can be tied as it extends; this lessens the chances of breakages from wind. Apart from tying, the projecting stub often offers protection to the tender shoots from birds resting, or the brushing of persons or horses when passing.

The buds on the stub above the inserted bud will start into growth, and if not attended to will be likely to sap the growth from the inserted bud. The way of dealing

with these buds which entails the least work is to destroy them by picking them out with the thumb nail or secateurs when cutting back the shoots in the spring, and if one caunot depend on finding time to pay attention to the buds later, probably this is the best plan. However, the inserted buds appear to come away with a healthier growth if the buds in the stub above are allowed to start. When this is done it is necessary to pinch back the growth from these natural buds later to prevent the growth from the inserted bud being sapped by them. The healthier growth from the inserted bud is probably due to the buds above drawing the sap, and later providing foliage, which assists in elaborating the raw sap. After the growth from the inserted bud has grown out a few inches and has an established appearance, the growths from the stub above can be brushed off to avoid further attention.

# Handling the Growth from Below the Bud or Graft.

Besides the growth from the buds on the stubs, many growths will start from the stock below the inserted buds, or from below grafts that have been inserted earlier in the spring of the current season. On nursery stock these growths are generally better rubbed off on sight, but on established trees that have been worked over with another



Fig. 1.—Young Budded Peach Tree, Showing New Shoots Tied to Stubs as Advocated.

variety it is far better to allow some of the growths from below the inserted buds or grafts to remain. However, attention is required or these growths may sap the growths from the inserted buds or grafts.

Some of the shoots from below the buds or grafts will show great vigour, and are better rubbed off at once or they will be a constant menace. The weaker shoots are better allowed to remain but should be inspected occasionally, and if any grow strongly they should be pinched or slashed back to prevent them sapping the growth from the inserted buds or grafts.

The advantage of leaving some growth on the stumps of worked-over trees below the buds or grafts is threefold. In the first place these growths provide some foliage to assist in the elaboration of the raw sap. It must be remembered that by cutting back the main limbs for grafting or budding the major part of the foliage is lost, and the roots thereby suffer partial starvation till sufficient growth is made to restore the bal-

ance between root and top. Secondly, the growth on the stumps shades the bark from the sun and promotes sap circulation, which prevents the sun from scalding the bark and thus establishing ideal entry points for wood-rot fungi. Thirdly, the extra growth assists in protecting the tender new shoots from the inserted buds or grafts from breakages by wind.

Sometimes when working over established trees some limbs are left unworked; where this has been done it is often necessary to check their growth during the following growing season, or they will sap the growth from the buds or grafts too much

# Treatment of the Shoots from the Bud or Graft.

The shoots from the inserted bud or graft should be interfered with as little as possible during the growing season, but when they make rapid growth it is necessary to pinch them back to prevent them being blown out by winds. Only the tender end of the shoot should be pinched back. If cut back into hardened wood, the shoot will sometimes fail to make a satisfactory growth again, and will remain stunted. For a year or two after



Fig 2.—Stump Grafting by Strap and Bark Graft.

Note profusion of natural growth retained below graft
to protect butt against scale and assist say elaboration

they start they must also be cut back rather severely when pruning in the winter, to prevent too rapid extension till they are well established.

Superfluous inserted buds should not be removed till those selected for framing the tree are well established and there is reasonable certainty that they will not be blown out or lost by other means; hence their gradual removal often extends over two or three years. During this period they are kept somewhat suppressed by more severe pruning than the selected growths, but are a useful reserve in case of losses among the latter.

Likewise, the superfluous scions on a grafted stump should be retained till the callous has spread well over and all round the cut edge of the stump. If only one scion is left on a thick stump the sap will not be drawn on the opposite side, and the bark will often die away on that side. The extra scions around the stump keep the sap moving on all sides and hasten the callousing over of the wound.

Though the delay in cutting them out often creates a fairly big wound when the operation is performed, such wounds are surrounded by a new callous and the liberal flow of sap causes them to heal over rapidly. As the growth from buds or grafts on reworked established trees often develops very rapidly there is danger during the first few years, until the callous has crept well round, of the shoots being broken out; for this reason it is wise to brace the new limbs with lashing or wires.

A great many of the stubs left from cutting back the budded shoots will dry up, but sometimes the natural buds are not completely destroyed and they may make a feeble growth and remain green. In either case the stubs should be removed. This can be most conveniently carried out during the following pruning season, but is preferable to delay the cutting out of these stubs till the following summer. It is often safer to do this cutting with a sharp, fine, narrow-bladed pruning saw than with secateurs.

# Citrus Trees and Their Irrigation Needs.

R. J. Benton, Special Fruit Instructor.

CITRUS fruits are grown in commercial quantities in areas of this State differing very greatly in climatic and soil conditions. In addition to a coastal strip 400 miles long (Grafton to near Camden) and averaging about 30 miles in width, citrus is produced inland, where the largest areas are on the Murrumbidgee Irrigation Area, and along the Murray from near Wentworth on the west to Barooga-Tocumwal on the east. Small areas are also grown in the central-west and north-west (Narromine, Dubbo and Narrabri).

Of the total production, averaging around 2½ million bushels, approximately half is produced under irrigated conditions, mostly in inland areas. There is an increasing trend to irrigate in coastal areas, but the scope is limited by lack of water.

The soils vary from light and sandy soils 9 or 10 inches deep in coastal regions, to very light, sandy to heavy clay loam soils, each of variable depth, in areas inland. The subsoils vary as widely as do surface soils. In each of the soil types in all citrus-growing localities, excellent trees may be seen, though seasonal conditions sometimes interrupt production.

The age of the trees varies largely in accord-

The age of the trees varies largely in accordance with the development in the locality. In some of the oldest coastal districts there are blocks of trees up to forty years of age, although most of the areas approximate twenty years, as a result of the stimulus to planting in the years following the first World War.

With very variable climatic and soil conditions, many of them not favourable, in most citrus localities, weaknesses in tree health are certain to develop after the trees have produced a number of crops. The number of crops that mav be harvested before poor tree health seriously affects production depends largely on how serious

are climatic and soil irregularities, and on the ability of the grower to understand and prevent the effects of unfavourable variants. Indications definitely suggest that the latter is a more important factor than the former, because there is much evidence that, given identical climatic conditions and apparently very similar soils, poor results eventuate when management is obviously less efficient. These results occur irrespective of whether irrigation is practised or not.

Declining production of citrus trees under nonirrigated conditions, however, is not so serious as is the case when water is applied to the land Lack of fertility and poor cultural practices are most often the cause of reduced production in non-irrigated orchards.

#### Serious Decline in Irrigated Areas.

As most of the trees irrigated are inland, tree health decline there is mainly related to the need for a better understanding of the requirements of citrus trees for soil moisture. There are grounds, too, for believing that many growers lack confidence because of some erroneous ideas—particularly that trees have reached their allotted span of life, or that soil types are poor, when this is not the case.

#### [THE AGRICULTURAL GAZETTE.

Serious decline and often collapse of trees is common on the Murrumbidgee Irrigation Area. Very similar experiences occur at Barooga, Barham and further down the Murray River; also at Narrabri. In each of these localities, however, there are many excellent trees, often in the same block that has trees in various stages

of decline from slightly affected to dead. Exploration to find the reason for this decline invariably results in the discovery that excessively wet soil conditions have been experienced, at least during some period. Often the land is deep and pervious, or is shallow and underlaid by a heavy subsoil, or a hard pan is present which holds up the water received, for unduly

long periods.

fact that trees in badly graded or low spots are usually those first to decline. Trees in very permeable soil, especially if underlain by less pervious subsoils, soon decline. Trees in slowly penetrable soils are less affected. Trees growing in isolated corners where irrigation is difficult or uneconomic are (if not lacking fertilizer) often excellent trees as compared with trees irrigated only a few yards away.

#### Indications of Approaching Decline.

Indications that orchards which are on rather unsuitable types of soil and are receiving an abundance of soil moisture, may be expected to experience decline of tree condition, are afforded by the excessively large-sized fruit generally pro-

Valencia Late Orange in Declining Condition.



Dr. Lillian Fraser, Plant Pathologist of the Department, has recently found a species of Phytophthora abundant, and causing much rotting of fibre and main roots of irrigated citrus trees. Root decay had been known to be present in these cases for some years, where wet subsoil conditions, had prevailed. The root-rotting organism thrives in wet soil conditions, and rapidly kills the trees unless conditions less favourable for its propagation and dissemination are provided.

An investigation into the reasons for the very much better condition of trees apparently un-affected—evidenced by their denser foliage, satisfactory twig growth, better production, etc.—shows absence of wet soil or subsoil conditions. If these trees are subjected to an occasional abundance of water (by rainfall or other cause) they are able to utilise the excess moisture. At times, too, the soil is so heavy that penetration is very restricted and evaporation removes the surplus moisture, thereby minimising the danger; trees in this environment are less susceptible to the decline condition.

Evidence supporting the contention that most of the tree decline under irrigated conditions is associated with excessive subsoil moisture—decline distinct from any effect of permanent or temporary water tables, which, if high, are well known to be dangerous-is afforded by the

duced. Such fruit is low in total solids, with consequent poor palatability.

A pronounced tendency to alternate bearing in Valencias is another probable effect of undue stimulation by irrigation, for this tendency is most apparent on trees from which maximum production is attempted. Fertilizer alone cannot, in the absence of abundant soil moisture, unduly stimulate, production.

Yet a further indication of approaching tree decline is the gradual development of a time lag in the response of the trees to irrigation. Trees planted in virgin soil respond vigorously and almost immediately to water, and this reaction continues irrespective of tree age, if "favourable conditions" are provided. When favourable conditions exist before water is applied, the root system is invigorated by its successful search for moisture. In this period of search for moisture a slight wilt of foliage may become apparent. With drought-stricken trees there is no time lag between rain and response by trees. It appears certain, therefore, that the common experience of a time lag, often of a week or more, by trees under irrigated conditions, is definitely an indication of an unsatisfactory soil moisture condition existing beneath the trees.

If the growing of citrus trees is continued under these circumstances for a period, and some

abnormal condition (such as a wet winter) occurs, very serious and rapid depreciation may follow.

#### Individual Trees May be Affected.

Often it is asked, "Why should that tree decline right in the midst of so many healthy trees?" The following are illustrations of the many reasons that could be advanced for such an occurrence.

Possibly on one occasion the irrigation of the tree in question was extremely light, or it missed altogether. As a result the crop was affected. If a heavy yield of fruit was carried, leaf and twig growth would, as a result, be below that of surrounding trees. A tree in such a condition would need less water than those trees with much greater foliage. It is probable that, in the irrigations following the light application, the grower would take care to ensure saturations. In this way conditions favourable to decline would be provided.

Another possibility is that such a tree has had a deeper root system, and has encountered moist soil conditions earlier than adjacent trees. It seems significant, for instance, that large trees like so-called Australian Navels often decline before other Navel strains. Of course, soils are rarely so uniform that penetration is even; hence in varying soil types the effects of irrigation are likely to be irregular, accounting for tree weakness at first in isolated spots.

Trees on the Murrumbidgee Irrigation Area, too, have been subjected to excessive wilting for lengthy periods without harmful effect to the crop carried, or to subsequent tree development. This test of endurance was applied by Mr. Bryden to trees at Yanco Experiment Farm during mid-December to mid-March, in the season 1929-30. The crop had set and was retained, though defoliation was heavy. The fruit failed to grow and actually wilted, and was shrunken in size until water was applied, when new growth rapidly developed and the fruit matured only a little smaller than on trees not subjected to such drastic treatment. A somewhat similar result was experienced at Lecton Experiment Farm last summer.

Should, however, prolonged wilting be experienced during the spring or early summer period whilst young fruit is setting, production is likely to be seriously reduced.

The best tree health conditions appear to be provided if trees are subjected to a wide fluctuation in soil moisture. This means that the ground should be evenly wetted, and no further water applied until the trees have almost reached a wilted condition. This condition can only be satisfactorily gauged by tree appearance early in the morning before transpiration is accelerated. The approach of a wilted foliage condition in a healthy grove is apparent, however, a few days before being actually reached. It rarely arrives





Flood Irrigation, Controlled by Banks Between Rows.



Water Requirements of Citrus Trees.

Citrus trees, like many other plants, grow satisfactorily and produce well in soils having a wide range of soil moisture content, varying from field capacity to almost wilting point. Production and tree health in non-irrigated orchards indicate that trees suffer no injurious effects when subjected to wilted conditions for short periods—often a matter of some weeks in these areas. It is rarely, however, that the evaporation rate in such localities would be as high as is usually experienced inland, and the transpiration rate, because of higher humidities, would also be lower.

suddenly-though it is much more rapidly apparent in weak trees.

Trees with dense large foliage demand more water than those with sparse foliage. Because of their reduced leaf growth (transpirational area) trees which have been pruned require less water than unpruned trees. The problem arises, where trees in varying conditions of health are growing in the one irrigation run, of supplying the variable needs of the trees. It must be satisfactorily met if improvement is to result, and it is most readily solved by diverting most of the water from and past certain trees.

# Citrus Orchardists note...

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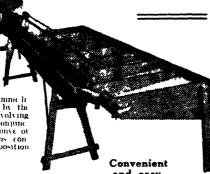
It may be regulated in 1 moment to 517c to a fraction of an mch

#### Constant

The moving fruit imme h The moving fruit immental this sits on edge by the letter of the revolving tubber toller in compute tion with the conve of belt and it remains constantly in this position from only of the

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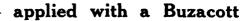
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Our climatic conditions are most variable—with days of cool to moderate temperature, during which evaporation and transpiration are low, and hot windy days of maximum moisture loss by those agencies. Irrigation practices more exacting than those necessary in other countries having more equitable conditions are therefore demanded here.

The margin of safety here is narrowed by greater variation in soils and climate than is the case in at least any of the American citrusgrowing States. Despite this variability, however, there is no need for pessimism, but there is need for a better understanding of the citrus trees requirements and a more determined effort—despite difficulties—to supply them.

#### Use of the Soil Auger.

The use of a soil auger is very helpful in determining how moist the soil is. Many holes should be bored, for some irregularities will be caused by sampling in proximity to or some distance from active roots. The auger is indispensable to indicate how much water should be applied. Use a 34-inch auger in sandy loams to clay loams, but in very light sandy soils, up to a 3-inch hollow core auger will be necessary if the sand is dry. The auger should not be less than 3 or 4 feet in length in accordance with the depth to which the roots penetrate. The soil type and its structure influence root penetration. On deep, light soils, therefore, the auger should be at least 4 feet long, and on loams of moderate depth 3 feet should suffice.

(To be continued)

## QUALITY GRADING OF PRUNES.

K. D. McGILLIVRAY, Orchardist, Wagga Experiment Farm.

QUALITY of fruit has been described as those characteristics which bring satisfaction to the consumer. They are: appearance, colour, size, flavour, texture, firmness, sugar and acid. A mechanical means of separating fruit into quality grades without costly hand sorting would be the realisation of a fruit packer's dream.

Quality in prunes is closely linked with maturity, full development of sugar and high specific gravity. The possibility of mechanical separation of grades of both fresh and dried d'Agen and Robe prunes by flotation in salt solutions of varying densities (gravity grading) was investigated, commencing in 1935, at Wagga Experiment Farm. It was found generally that the poorer quality prunes floated and the better quality sank, and that when the heaviest salt solution was in use, a prune had to be well loaded with sugar to get to the bottom of the vat. However, many other interesting facts were brought to light.

#### Gravity Grading of Fresh Prunes.

Weigard and Bullis\* favoured gravity-grading of fresh prunes before drying, but a serious obstacle under our conditions soon became evident. Fresh prunes which would be identical when dried, may be separated, by gravity, when fresh, merely because slight shrinkage had taken place in a number of them on the tree. This point had to be noted, because partial withering or wilting of prunes on the trees is not uncommon in the main prune growing districts of New South Wales In 1036 it was found that the higher specific gravity fractions contained most of the wilted fruit, even although some of it was immature. Gravity-grading had mixed immature wilted fruit with full plump fruit. Damaged and broken prunes were not always effectively separated and were found in each quality grade.

A point in favour of gravity grading is that fermented fruit separated reasonably well, but it has been recorded overseas that fresh fruit infected with brown rot had to be in an advanced state of decomposition to make possible its separation from non-infected fruit by the flotation process.

The accompanying table and the descriptive notes relate to a representative season's work at Wagga.

#### GRAVITY GRADING OF PRUNES.

	Grade	Specific gravity of solution	 Percentage by weight each grade
A B C D F	· · · · · · · · · · · · · · · · · · ·	1:11 floaters 1 12 floaters 1 13 floaters 1 14 floaters 1 14 sinkers	 4.9 1.1 2.5 3.9 87.0

#### Procedure.

Fresh d'Agen prunes were graded in salt solutions of varying specific gravity as shown in the table.

Salt was added to water in a vat until the solution gave a specific gravity reading of I.II. A weighed quantity of d'Agen prunes was placed in the solution, and it was found that 4.9 per cent. floated and the remainder sank. After the separation of those which floated the remainder were placed in a slightly heavier salt solution of 112 specific gravity. Separation of those which floated was continued in this, and in solutions of 113 and 1.14 specific gravit.es, until the highest grade—those which sank in the heaviest solution (1.14)—was obtained. As shown in the table, 87.6 per cent. sank in this solution.

<sup>\*</sup> Oregon State Agricultural College.

It was noted that while, generally, the higher specific gravity solutions separated the better quality fruit, a good deal of variation occurred in all grades. This was accentuated and the grading considerably complicated by the presence of withered and whole fruits in each lot. For example, the lowest grade "A" included a high percentage of withered fruit with dark flesh which showed dank fermented areas and cavities, but there was some firm fruit of a light golden colour.

#### Drying.

The various grades were dried separately and examined after drying, when it was found that the differences which had been apparent between grades in the fresh state were somewhat modified Cavities and differences in flesh texture still existed, and variations in colour of flesh remained noticeable, but generally these were less clearly defined as between the grades. In addition, the variations within each grade were still in evidence to some extent.

#### Processing.

Samples of each grade were processed as for dessert purposes. The accepted methods of dessert prune processing were applied uniformly to each grade. The general results of the processing tests indicated that there was very little difference between the grades as far as appearance, flavour and texture were concerned. Upon close examination cavities in the flesh and variations in porosity, in addition to differences in flesh colour, were discernible, but it was possible to distinguish such variations within each grade, as well as between the grades.

It will be realised that modern methods of processing to produce the soft dessert prune required by the trade, largely overcomes differences in general quality. Small cavities or slight variations in porosity would pass unnoticed by the average consumer.

#### Gravity Grading of Dried Fruit.

At this stage work with fresh prunes was discontinued, and only that with dried fruit was kept going.

It was found that, after size grading of the dried fruit, approximately 4 per cent. of d'Agens and 9 per cent. of Robe prunes floated in low

density salt solutions (1.06 specific gravity). These prunes were, comparatively, the poorest in quality. They were usually reddish in colour, showing porous flesh with cavities and air pockets: some, in fact, were "bloaters." The flesh colour varied from dark to light golden, and the taste was generally reasonably sweet.

Flesh colour and texture varied within the grades and damaged prunes were found in all grades.

Although the low density floaters were of poorer quality than the remainder of the prunes, it can be said generally that they were reasonably good to eat and, when included in a bulk sample and processed, had practically no effect on the general impression of quality.

Similarly, the sinkers from immersion in a heavy density solution of 1.21 specific gravity did not produce noticeably better dessert prunes than other grades.

One of the difficulties which gravity-grading of dried fruit brought to light was that some high grade fruit floated into the lower grades, because of a light weight pit or air pockets around the kernel.

#### Summary.

Wilting of the fruit on the trees, not uncommon in New South Wales, is a serious obstacle to gravity grading of fresh prunes. The loss of moisture increases the density, and allows this fruit, even if immature, to find its way into the higher grades.

The grades are defined to a moderately clear extent in the case of fresh fruit, but variations in texture and general quality between grades become less noticeable after drying, and almost disappear after processing as for dessert prunes

The pit exercises an appreciable influence on the gravity grading of dried prunes, due to variations in weight and the presence of air pockets

Even the lowest grade of fruit, which was revealed by these trials, had reached a stage of maturity which would produce a reasonably sweet stewing or dessert prune. The amount of this fruit, too, was small. It is thought that the greater part of the New South Wales prune crop would give similar results.

In this State there does not seem to be a place for gravity grading at present.

### Effect of Naphthalene on Stored Lucerne Seed.

In 1941 tests were begun to determine the effect of flaked naphthalene on lucerne seed in storage. Mr. T. H. Bray, "Vychan," Eugowra, supplied newly-harvested seed in sufficient quantity to enable the tests to be continued for several years. The sample was tested for germination on its arrival and then stored in the laboratory (a) in small bags, and (b) in corked phials, with naphthalene at the rate of 1 oz per bushel (the usual Departmental recommendation) and at 2 oz. per bushel, the suggestion of the Chief Entomologist.

The year-old seed has deteriorated only slightly and was not affected by storage conditions; no insects developed in the stored samples.

The original germination was 80 per cent. with an additional 5 per cent "hard" seeds. At the end of the first year's storage the results were:—

	Unscaled.	Sealed.
Control	78 per cent. with 2 per cent. hard seed	79 per cent. with 4 per cent. hard seed
z oz. naphthalene per bushel.	80 per cent. with 1 per cent. hard seed	82 per cent, with 2 per cent, hard seed
2 oz. naphthalene per bushel.	80 per cent. with 3 per cent. hard seed	77 per cent. with 4 per cent. hard seed

Note.-All tests were made in duplicate.

AMY MYERS, Seeds Officer.

#### PLANT DISEASES.

### Diseases of Potatoes.

AS most of the important diseases of potatoes are carried in the seed the importance of planting only "certified" seed, and of disinfection of the seed before planting, cannot be over-estimated.

#### Virus Diseases.

The "running out" of potato varieties is mainly due to the accumulation of virus diseases. A number of different viruses attack the potato, but the severity of the diseases they cause depends on the kind of virus, the variety of potato and the conditions under which the crop is grown. In Factor, the variety most widely planted in New South Wales, Leaf Roll is the most important virus disease, but in other varieties Mosaic may also be a source of loss. Leaf Roll and Mosaic are carried over from crop to crop in the tubers, and are spread from diseased to healthy plants by means of aphids. Bronze or Spotted Wilt, another virus disease, may also be important in crops grown near cities and large towns.

Bronze or Spotted Wilt.—This virus disease is spread from diseased to healthy plants by thrips—small flying insects—which migrate into the crop. Tomatoes, lettuce and many ornamental plants and weeds are subject to this disease and may act as distributing centres for the virus. Brown dead spots or rings appear on the leaves, the effect being most severe on the younger leaves, which may be killed. The disease extends to the shoot apex causing blighting and death. The severity of the symptoms depend on the age of the plant at the time of infection. Old leaves may show only zoned brown spots.

#### Common Scab.

This disease is caused by a soil-inhabiting fungus and occurs also on turnips, beet, carrots, etc. It



Effect of Less Roll on Factor Potato Plant.

Left.—Healthy plant.

Right.—Diseased plant.

Note the stunted, upright appearance and rolling of leasiets on the diseased plant.

Leaf Roll.—Affected plants are stunted and have an erect, stiff habit. Commencing at the base of the plant, the leaves become thickened and leathery and the margins curl upwards. Affected plants are otherwise healthy and there is no stem rotting or tuber decay—symptoms seen in other diseases which may, under some conditions, cause a type of leaf rolling. Tubers from Leaf Roll plants cannot be distinguished with certainty from healthy tubers, but sometimes give spindling sprouts. The yield of a plant may be reduced by one-half or more by Leaf Roll.

Mosaic.—Like Leaf Roll, Mosaic is a tuber-horne virus disease and is spread by aphids

Mosaic.—Like Leaf Roll, Mosaic is a tuberborne virus disease and is spread by aphids Leaves of affected plants show a mosaic mottling of varying intensity, and the plant is usually stunted and the yield reduced. does not affect germination or edible quality, but reduces the market value and prejudices the keeping quality of the tubers. The scab begins as small brown specks, which increase in size as the tuber grows and frequently coalesce to form a more or less continuous scabbing of the surface. The form of the scab varies from raised corky areas to deep pits depending upon the district, season and variety. Almost all virgin soils contain the scab fungus, and continued cropping increases its abundance. Acid soil conditions are unfavourable to the development of scab, and since most potato soils in this State are strongly acid (pH 5.3.5.5), the disease is only liable to be severe in dry seasons, or following the use of lime, or where ashes from a "burn" during clearing were deposited.

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#### Powdery Scab.

This disease is not of great economic importance in New South Wales. It is caused by a soil-inhabiting fungus and is favoured by wet, cold conditions. Affected tubers are liable to develop secondary tots if stored. The disease first appears as small brownish swellings which enlarge and buist open, the skin curling back slightly around the spot. The spots are circular or oval and may occur singly or in groups. Each is filled with a brownish powder, the spores of the fungus. In severe cases deep cankers may be formed. Small galls also may occur on roots and stolons.

#### Rhizoctonia Disease.

This disease receives its name from the ciusal fungus Rhizoctonia solani It is also known as Black Scurf Black Speck Russet Scab etc Affected tubers bear superficial brownish-black lumps varying in size from quite small speeks to considerable crusts one-third of an inch in diameter of more. This is the resting stage of the tungus. When affected tubers are planted these resting bodies become active and under cool moist conditions considerable damage may result. If wet conditions are experienced at planting time the sprouts may develop a brownish rot and may be killed before appearing above ground If wet conditions are not experienced until the plant is established brown cankers may develop at the base of the stem and on the roots the top leaves become crowded together due to a shortening of the stem, giving the plant a rosetted appearance. The leaves take on a purplish tint or become yellowish and the margins are curled up If conditions favour the exten sion of the disease the plants are killed but if the soil is dried out quickly they may make a substantial recovery and the leaf symptoms dis appear

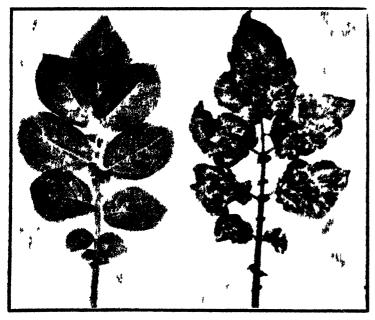


Spindling Sprouts, a Symptom which Frequently
Accompanies Leaf-roll
[After Heald]

As well as being carried on from crop to crop on the tubers the fungus may exist in the soil as resting bodies and fungous threads

#### Late Blight.

This is a fungous disease which can affect all parts of the plant. The most characteristic

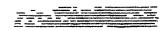




#### Mosaic Disease

I cawe fir m | lants infected with Mosaic are mottled with yellow and deep green and are often puckered and wrinkled Healthy plant on left

[After Johnson



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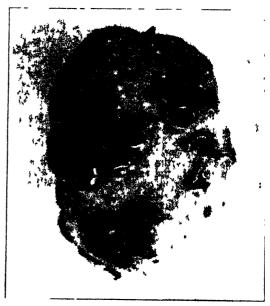
Rings of Dead Tissue, caused by the Bronze Wilt Virus



Small Raised Form of Common Scab.



Hhe Large Raised Form of Common Scab

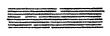


Potato Tuber affected with Powdery Scab



Tuber showing Resting Bodies of historionia





The Rosetted
Appearance
of the Centre Plant
is Typical of Fairly
Severe Rhisoclonia
Attack.



symptoms appear on the leaves in the form of dark, water-soaked areas, usually commencing at the leaf margins. These enlarge rapidly and the leaves blacken and shrivel or rot away. Under moist conditions the disease spreads with alarming rapidity. In the early stages of development a close examination of affected leaves will reveal the presence of delicate downy outgrowths of the fungus on the underside of the leaf at the edges of the lesions. These are masses of spores by which the disease is spread

Tubers may be infected before digging by spores washed down from the leaves, or by contact with diseased foliage at harvesting. Purplish black sunken spots are formed, which may increase in size until the whole tuber is involved. Below the spots the tissue is at first reddish-brown and later decays either as a dry rot, or more frequently as a wet rot.

The disease may originate from infected tubers used at planting, or not removed at harvesting, or possibly the fungus may live over in the soil in a resting condition

#### Early Blight.

This is a fungous disease attacking the leaves, and under favourable conditions, the tubers also. On the leaves it causes rather angular, concentrically zoned dark-brown spots, and on the tubers shallow pits. If cut through it will be seen that the tissue below the pits is affected only for a very short distance, but such tubers are subject to storage rots.

#### Blackleg.

The blackleg disease of potatoes is caused by a bacterial organism. Under warm wet conditions it may be responsible for appreciable losses, both by killing the growing plant, and by rotting the tubers either before or after harvesting. The disease causes an inky black decay of the main



Plant Affected with Rhizoctonia showing Stem and Root Cankers, and Rosetting of Tops.

[After Gost.



Section of Potato Affected With Late Blight

stilk which processes upward and above ground from the seed tuber which is invariably rotted Young and old plints are attacked causing the leaves to all with and turn vellow. The vhole optimism may attack the new tubers producing a seft black rit which may centime developing mistorice. The organism may live over in the soil from one seas in to the next attacking pital toes only when weather conditions favour its levelopment.

#### Eelworm.

The root In tinemat de is most series in sindy soils. It attacks a great variety et annual and receinful plants. In politics, yields are reduced and the tulers produced are covered by counded lumps in which it cut open the female nematode may be seen as a white glistening boils mewhat smaller than the head of a pin

#### Wilts.

There we three different organisms which ause wilts of the potato plant and it is some times impossible to distinguish them on held examination alone. I wo wilts are due to parasitic fungi (Insuram and I exterillium) and there is a bicterial wilt (or brown rot). I usurum wilt is characteristic of warm conditions and Verticillium does most damage under relatively cool conditions. Both cause stunting yellowing of the foliage and finally wilting and death. The progress of the disease may be slow or rapid, according to weather conditions. The stems of affected plants are brown and rotted at and just below ground level, and a brown discolouration may be present in the woody parts of the stem above the rotted area. Tubers produced by affected plants are mostly infected, and show a ring of discoloured tissue in the region of the veins. Discolouration of veins is not always due to disease, but may occur under droughty and very hot conditions.

are capable of living in the soil for considerable periods. The transference of the diseases to new areas takes place by means of intected tubers.

Bacterial Wilt of Brown Rot--The brown for bacterium also attacks a very great number of other varieties of plant. It is essentially a warm climate disease, and in New South Wales is most common in coastal districts especially the North Coast. Besides producing a characteristic tuber for the disease causes wilting of the foliage. At first, this is slight and occurs only in the hottest part of the day the plant recovering at hight but the wilting becomes gradually more pronounced until finally there is no recovery and the plant dies. There is no discolouration of the foliage. Sometimes only some of the stalks in a buil are affected, the others remaining healthy

A brown discolouration of the woods parts can be seen if the stems roots or stolons are



Water-soaked Areas which Spread Rapidly are a Sign of Late Blight

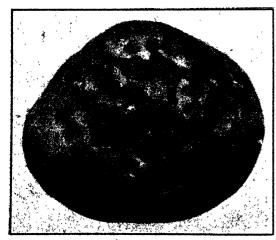


Target-like Angular Dark Spots of Early
Blight,
[After Chupp.

cut through and usually, after a few minutes, bacteria ooze out from the discoloured parts in a white slimy mass. Infected tubers, if cut across, show a similar brown discolouration and bacterial ooze, which distinguishes this disease from the fungous wilts. In severe cases of infection a greyish-coloured patch or depression is formed at the point of attachment of the tuber and a bacterial ooze may occur from this, mixing with the soil and sticking it to the surface of the tuber. The disease is carried over from season to season in the soil and in affected tubers. It is, however, most often serious on newly cleared land.

#### Non-parasitic Diseases.

Hollow Heart.—This sometimes occurs if tubers are growing too rapidly, due to excessive amounts



A Tuber infected by the Early Blight Fungus showing Shallow, Roundish Coalescing Pits.

of nitrogen in the soil or a flush of growth following rain.

Brown Fleck.—The cause of this disease is not known, but it is most prevalent in crops grown on light, acid soils, especially under dry conditions. Affected potatoes do not give rise to a diseased crop, but are unsuitable for cooking. Soils liable to brown fleck should not be cropped to potatoes.

#### Control Measures.

Seed Selection.—Only "certified" seed or seed known not to be infected with virus diseases should be planted. "Certified" seed is the product of crops which have been inspected by officers of the Department of Agriculture and declared reasonably free from virus and other diseases. Crops are only accepted for certification in districts known to be favourable for seed



Young Plant affected with Blackleg. Note absence of seed tuber.

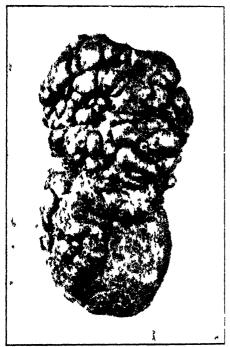
production; these are mainly areas of high altitude, such as the Southern Tablelands and the New England district. Plants infected with virus diseases are "rogued" from the crops early in growth, and only crops low in virus infection diseases are passed. (See Plant Disease Leaflet No. 53, available from the Department, for details of roguing methods). Coastal growers purchasing certified seed for spring planting will usually find seed saved from that crop satisfactory for planting in the autumn, if spotted wilt and other virus diseases have not caused it to deteriorate.

#### DECEMBER 1, 1942.]

It is, however, advisable in coastal districts to introduce new certified seed from Tableland crops each year or every second year

Crop Rotation—Rotation of crops is an important factor in controlling potato diseases because many disease producing organisms live over from year to year in the crop refuse and decaying organic matter in the soil. Some of these or gamisms remain alive in the soil in the absence of potatoes for several years so a four or five year rotation of potatoes with other crops has proved most satisfactory under most conditions. These disease-producing organisms tend to in crease in the soil following introduction if potatoes are grown year lifter year in the same soil

Need Disinfection -Usually it is profitable to disinfect all tubers used for seed. It will insure against losses from Rhizoctonia disease and in most soils will reduce losses from seab. The



Potato Tuber showing I umpy Appearance due to Eelworm Attack

tubers may be treated any time before they begin to sprout Seed treated before storing is less subject to decay than unfreated stock. Seed to be disinfected should be as free as possible from dirt preferably washed clean

Seed disinfection with corrosive sublimite has proved the cheapest and best in New South Wales

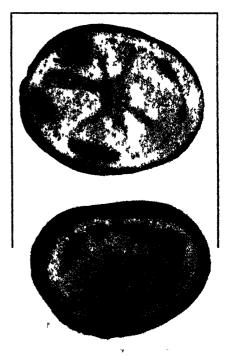
To prepare 25 gallons of disinfecting solution dissolve 4 oz of corrosive sublimate by stirring in 2 pints of commercial hydrochloric (muriatic) acid in a glass or glazed earthenware vessel. This stock solution is then diluted with water in a wooden barrel or vat so that the final volume is 25 gallons. This is sufficient to treat I ton



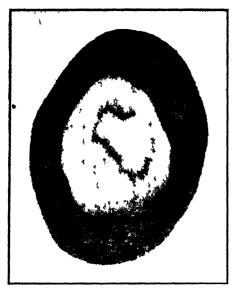
Potato Plant showing Wilting

of seed. Cement or metal containers should not be used unless painted with bitumen. The time of treatment is 10 minutes.

With repeated use the solution slowly loses its strength, but it may be safely used for ten to fifteen dippings. Unless the seed is very dirty, the time of treatment should then be extended to fifteen minutes and the weakened solution will still be effective for an additional five dippings. After this it will be of uncertain con position and should be discarded



Tubers Infected with Fu arium, showing Ring of Discoloured Tissue



A Type of Discolouration which is Not Due to Parasitic Attack

When the price of corrosive sublimate is high as at present the proprietary tuber disinfectants. Hortosan and 'Arctan' are competitive in price and are more convenient in use since they may be used in metal containers.

The potatoes should be placed directly into the solution and not dipped in bags. A convenient method is the use of a wooden crite which is built to fit snugly inside a wooden barrel. The



Potato Tuber cut to show Internal Symptoms of Brown Rot



Brown Fleck

lifting of the full crate in and out of the barrel may be done by means of a pulley block and tackle. Wooden crites built to fit inside a wooden year also year satisfactory. Sufficient selution should be used to cover the portions.

The treatment may be used for sprouted tubers it necessary but it may result in delay in subsequent sprouting

(virostic sullimate is a deadly fissin if talen internally by stock is human beings end should be handled and stred with caution - I request (Continued in page 551)



Hollow Heart is Due to Excessively Rapid Growth.



#### THE IMPORTANCE OF BREED IMPROVEMENT.

THE importance of breed improvement in the apiary may scarcely be over-estimated. With efficient carrying out of the work involved, it is possible to increase production of honey and beeswax, relieve swarming problems, increase resistance to disease, and improve the temperament of the bees so that the hives may be manipulated with a full degree of comfort. It is possible to raise the standard of a colony of bees from the lowest to the highest by the simple procedure of removing the old queen and introducing another one of special breeding; the complete occupation of the hive by the worker progeny of the new queen may be effected within the short period of from eight to ten weeks. In view of these facts, there appears to be little excuse for any bee-farmer not giving careful attention to breed improvement in his apiary.

Yet another important and interesting feature associated with breed improvement in bees is that once a well-bred queen has been established in a hive, it is possible to raise an almost unlimited number of young queens from this single source. The queen lays thousands of eggs for the production of worker bees during the active broodrearing season, and the larvae emerging from as many of these fertile eggs as the beekeeper has the colony capacity and assistance to deal with may be employed to produce young well-bred queens. In this respect the bee-farmer appears to have a definite advantage over breeders of other farm animals, and he should make the best of the exceptional facilities available to him.

#### Drone Selection is Essential.

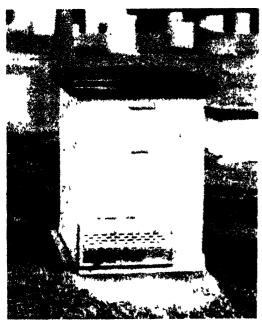
To be really successful in bee-breeding operations it is essential that particular attention be given the selection of drones as

well as of the queen. It is found on many occasions, however, that the drone, whose influence in breeding may be just as potent as the queen, is more or less neglected. The queen leaves the live when about five days old for her one and only mating with the drone, and as they mate whilst on the wing, we have no direct control over the breeding from the male side. It is necessary, therefore, that the bee-farmer direct his efforts towards eliminating the drones from hives in which the breeding is not of a sufficiently high standard. On the other hand, the production of drones in selected colonies should be encouraged

#### Control of Drone Raising.

In an endeavour to prevent drone-rearing by colonies other than those selected for the purpose, all patches of drone-comb in the brood-nest of those hives should be cut out and replaced neatly with pieces of good worker comb. It is necessary also to observe that proper bee-space, as in the factory-made hive, is provided between the sets of frames in the brood chamber and supers. Where over-spacing occurs the bees are sure to build a quantity of burr-comb consisting almost entirely of drone cells, and this may be used for raising undesired drone brood. Live drones in the hive may be removed by the judicious use of drone-traps.

To encourage drone-production by selected colonies, a number of brood-combs containing a fair percentage of drone-cells should be inserted in the brood-nest of these hives. It is advisable, too, to practise stimulative feeding, particularly during times



A Drone Trap Placed on a Hive.

when there is a shortage of natural supplies from the fields. In cases where the feeding does not induce the bees to continue raising drones in numbers, it will at least contribute toward ensuring that those already in the hive are allowed to remain.

#### Selecting the Stock.

In making a selection of a colony for production of drones the following points should be closely observed:—(a) The queen bee should be of tested, pure stock; (b) the worker-bees should have proved well above the average in honey-production, steady on

the combs, and not unduly temperamental; (c) the colony should be able to winter in good condition and to build up in strength readily during spring; (d) the bees should show an inherent tendency to resist dwindling and to combat other diseases.

The bee-farmer should be even more exacting in regard to these requirements in the selection of a colony from which to raise queens. He will require to test thoroughly the royal progeny of the breeder to ensure that they reach a high standard.

Queen bees may be purchased from beefarmers who specialise in bee-breeding work at the very reasonable price of from 6s. to 7s 6d. each. By this means a sound basis for breed-improvement may be established in the apiary. After a sufficiently reliable test in the apiary, it should be possible to select from this introduced stock a satisfactory breeding queen and provide colonies for drone-production.

#### Artificial Insemination of Queen Bees.

Much valuable experiment work has been carried out, particularly in the United States of America, in the artificial insemination of queen bees, and a measure of success sufficient to lead us to believe that the practice will be extended, has been achieved. The fact that it has now been found possible to make a direct selection of the drone to supply sperm for the insemination operation, offers very great possibilities in special breed improvement work The delicate operation associated with the collection of the sperm from the drone, and its injection to the genital organs of the queen by means of a microsyringe, may only be applicable, at present, in the laboratory, but there is no reason why special institutions in any country should not undertake the work after the war, when scientific staff becomes available for such operations.

#### Branding of Queen Bees.

A number of prominent bee-farmers in this State are interested in branding their well-bred queens and, before the war interfered with imports from overseas countries, it was possible to purchase a useful outfit for the purpose. The actual brand consists of a small metallic disc with a number on it, obtainable in various colours. The disc is pasted well up on the thorax where it becomes firmly attached. This provides for identification of the queen and the keeping

of a sure record of her service. In addition, it is much easier to locate the queen when carrying the brand.

Another plan which is finding favour, is to mark the thorax of the queen with a touch of coloured household enamel. The



Rebuilt Cover and Bottom Board,

mark may be best applied with a fine-pointed camel-hair brush so as to avoid too liberal an application, which may result in smearing and its accompanying discomfort to the queen.

### Supply of Beekeepers' Requirements.

Manufacturers of beekeepers' supplies are endeavouring in every possible way to meet the urgent requirements of the industry under extremely difficult circumstances, and bee-farmers should not become over impatient when some delay occurs in completing an order, or when some rationing has to be observed with certain materials. Timber and some other items used in the manufacture of bee goods are so essential to the war effort that urgent defence needs have first priority over the available supplies. The bee-farmer may afford considerable relief by ordering only the bare necessities, so that others may be enabled to obtain a fair share. There is one great lesson learned from bees—that of extreme unselfishness—which should be instilled in the bee-farmer more than any other p rson, as a result of his invironment.

A bee-farmer should carry on with the honey-house equipment on hand, where it is possible to manage, even though some of the items may be a little out of date. Then again old hive material that may be usefully renovated should be put into use. Hawkesbury Agricultural College recently sound pieces of timber have been sawn from old covers and bottom boards, and the reconstruction work has produced some very useful material. The accompanying illustration shows a rebuilt bottom board and cover, and it will be observed that the former has been made into a modern type with its deep cleated supports to give added strength and rigidity. In making covers waterproof, it is found that pieces of secondhand galvanised roofing iron, well flattened out and neatly cut to shape, are most serviceable.

### Diseases of Potatoes.

(Continued from page 578)

wetting of the hands with the solution may cause some irritation, so that it is advisable to rub the hands with fat before commencing dipping operations. After treatment the potatoes should be dried rapidly, as otherwise the eyes may be damaged.

Spraying.—Spraying is a routine practice in some districts where losses from late blight can be expected almost every season. This applies to the North Coast and better rainfall districts, and

to irrigated crops in the Sydney Metropolitan Area. In parts of the Dorrigo and in the Robertson districts also losses would appear to be frequent enough to justify spraying in most seasons. 4-1-10 home-made Bordeaux mixture (see Spray Leaflet No. 1, obtainable from the Department) is the spray recommended, and the first application should be uade when the plants are 6 to 8 inches high. Spraying should be repeated frequently enough to keep new foliage covered, particularly during wet seasons.

# Talking will Not Win the War. It may lose it!

### Tubercle-free Herds.

THE following herds have been declared free of tuberculosis in accordance with the requirements of the scheme of certifying herds tubercle-free, and, unless otherwise declared, this certification remains in force until the date shown in respect of each herd:—

Hawkesbury Agricultural College, Richmond (Jerseys)	Owner and Address.	Number Tested.	Expiry Date.	Owner and Address.	Number Tested.	Expiry Date.
Wollongong	N and C Down a Wastern Assess Waste		1942.	Comp Barrels A Francisco		
Wollongbar Experiment Farm   112   6   8   7   1. Tooleye, "Mandemar," Berrima   56   8   8   7   1. Tooleye, "Mandemar," Berrima   56   8   8   7   1. Tooleye, "Mandemar," Berrima   52   7   1. Tooleye, "Mandemar," Berry   52   7   1. Tooleye, "Mandemar," Berry   54   7   1. Tooleye, "Mandemar," Berry   56   8   8   8   1. Tooleye, "Mandemar," Berry   57   1. Tooleye, "Mandemar," Berry   58   1. Tooleye, "Mandemar," Berry   59   1. Tooleye, "Mandemar," Berry   50   1	Wollenger		r Dec	D W Burtonshaw Villean Inversil		
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W. C. Wyatt, Sherwood Road, Merrylands 29   12	W. I. Stephenson, "Hill View," Fig Tree		"	Kahlua Pastoral Co., "Kahlua." Coolac		
Lunacy   Department, Gladesville   Montal Hospital	W. C. Wyatt, Sherwood Road, Merrylands		"	Lunacy Department, Rydalmere Mental	3-7	20 ,,
Hospital Hawkesbury Agricultural College, Richmond (Jerseys)			,,	Hospital		30
Hawkesbury Agricultural College, Richmond (Jerseys)	Hospital	22	14 ,,	W. I. Prizelle, Rosenstein Dairy, Inverell		I Aug.
September   Sept	Hawkesbury Agricultural College, Richmond		•	W. Budden, "Hunter View," Kayuga Road	'	
Bathurst Experiment Farm (Ayrshires)		128		Muswellbrook	18	7 ,,
C. Brownlaw, Gol Gol			18 ,,	T. McLane, Wellingrove, Inverell		10 ,,
Huristone Agricultural High School, Glenfield   M. W. Martin, "Naroma," Urana Road, Wagga				W. Willis, "Rosedale," Inverell		
Segnance Estates, Scone	C. Brownlaw, Gol Gol	34	20 ,,	A. Hannaford, Braidwood	1 1	
W. W. Martin, "Narooma," Urana Road, Wagga			- 6		1	
Wagga	neid	33	20 ,,		35	25 ,,
A. G. Wilson, Exeter (Jerseys)	w. w. marun, "Narooma," Urana Roau,		40			
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McGarvie Smith Animal Health Farm, Liver- pool						20
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A. C. O'Dea, Perry Street, Dundas			6 ,,	Woomargama Estate	207	
New England University College, Armidale 13   1 Mar. W. Boland, "Seaton," Inverell 9   1 ", Parker Bros., Hampton Court Dairy, Inverell 105   1 ", Department of Education, Yanco Agricultural Hospital 60   69   67   69   67   69   69   69   69	A. E. Stace, Taylor Street, Armidale	31	7 ,,	Barnardo Farm School, Mowbray Park	75	
W. Boland, "Seaton," Inverell				State Penitentiary, Long Bay	10	9 Dec.
A. D. Frater, King's Plain Road, Inverell 106	New England University College, Armidale	13		7,	1	
A. D. Frater, King's Plain Road, Inverell 106	W. Boland, "Seaton," Invereil	9		Limond Bros., Morisset	tio	13 Jau.
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R. C. Dixon, Elwatan, Castle Hill (Jerseys)   23   3 April.   Wagga Experiment Farm (Jerseys)   81   20   27   1			"			
St. Michael's Orphanage, Baulkham Hills 18 5 5 102 Liverpool State Hospital and Home 102 10			3 April.			
Liverpool State Hospital and Home	St. Michael's Orphanage, Baulkham Hills			St. Ignatius College, Riverview		27 ,,
T. J. Wilks, "Oaks Farm," Muswellbrook   37   5 June	Liverpool State Hospital and Home	102	_ 1	Lunacy Department, Callan Park Mental		
17   18   18   18   18   18   18   18		- [		Hospital		ı May.
K. W. D. Humphries, "Karoola," Muswell-brook	Road, Inverell			T. J. Wilks, "Oaks Farm," Muswellbrook	37	5 June.
Drook	Grafton Experiment Farm	190	17 ,,			
H. F. White, Bald Blair, Guyra (Aberdeen Angus)		-				
Angus)		102	24 ,,			
Herry Training Farm, Berry   162   31     Lidcombe State Hospital and Home   163   30       S. E. E. Cohen, Auburn Vale Road, Inverell   23   12 May.     B. N. Coote, Auburn Vale Road, Inverell   53   14   ,     J. De Ville, Inverell   10   15   ,     A. N. De Fraine, Reservoir Hill, Inverell   22   15   ,     (Beef Shorthorns)   82   28   ,			-6	0. 171		
S. E. E. Cohen, Auburn Vale Road, Inverell 23   12 May.   N. East, Gum Flat Road, Inverell   05   13 Aug.   N. Coote, Auburn Vale Road, Inverell   14 ,						
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A. N. De Fraine, Reservoir Hill, Inverell 22 15 ,, (Beef Shorthorns) 82 28 ,,				Peel River Land and Mineral Co., Camworth		-3 "
			-1 "			28
	Sir F. H. Stewart, Dundas		30 ,,	,		",

#### Tubercle-free Areas.

The following Areas have been declared tubercle-free and no cattle are allowed to be kept therein unless subjected to the tuberculin test and found free from tuberculosis:—

Bombala Area. Inverell Area. Braidwood Area. Municipality of Muswellbrook. Municipality of Queanbeyan.

MAX HENRY, Chief of Division of Animal Industry.

### 1943-44 Egg-laying Competition.

POULTRY-FARMERS are reminded that applications for pens in the 1943-44 Egg-laying Competition to commence at Hawkesbury Agricultural College, Richmond, on 1st April, 1943, will close on 6th January, 1943,

by which date the application form showing particulars of stock owned at 31st December, 1942, must be in the hands of the Principal, Hawkesbury Agricultural College, Richmond.



# NO CHRISTMAS EXCURSIONS

THERE will not be any Excursion trains or Excursion fares from or to the country this Christmas.

This announcement is in keeping with the resolve of the Authorities to restrict civilian railway travel to cases of absolute necessity.

Appeals already made to the public not to use the railways unnecessarily have met with a gratifying response, and the Commissioner for Railways, Mr. T. J. Hartigan, has no doubt that the people will continue to co-operate cheerfully in the great "Win the War" effort which the railways are making.

It is hoped that the time is not far distant when the people may welcome a post-war return of the efficient services and the concessions which they enjoyed in happier times.

S. R. NICHOLAS,
Acting Secretary for Railways.



# YOU CAN STILL BUY BERGER'S

In our 182 years of colour and paint manufacture we have heard the roll of war drums many times and have seen the battle colours of Old England furl in victory again and again. From the time of our inception in the year 1760, when Lewis Berger made the finest quality dry colours, through the many complex developments in paint manufacture, Lewis Berger and Sons have always been in the vanguard in producing paint products of the highest standard. Now, to-day, under the exigencies of war, the call is for a paint formulated from Australian raw materials, and our laboratories have immediately responded. They have developed a range of prepared paint to wartime specifications. A range outstanding for durable quality, giving longlasting protection to the nation's assets—the homes and buildings throughout the Commonwealth. \* A complete range of Berger paint products is available for all A.R.P. requirements.

# Berger's Paint

"Keeps on Keeping on."

For

STOCK OWNERS

and POULTRYMEN



To

Provide the Necessary

Protein

Supplements

# IMPERIAL STOCK FOOD PRODUCTS

#### Obtainable from-

- Riverstone Meat Co. Pty. Ltd.,
   5 O'Connell Street, Sydney.
- Redbank Meat Works Pty. Ltd., Stanley Street, South Brisbane.
- W. Angliss & Co. (Aust.) Pty. Ltd.
   42 Bourke Street, Melbourne.
- Central Queensland Meat Export Co., Lakes Creek, Rockhampton

# THE PUBLIC TRUSTEE

(Established 1914)

Since which date assets exceeding forty million pounds in value have been administered

as

EXECUTOR, TRUSTEE,
ADMINISTRATOR,
ATTORNEY or AGENT

Full information and FREE BOOKLET
may be obtained on application to his
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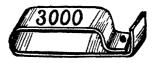
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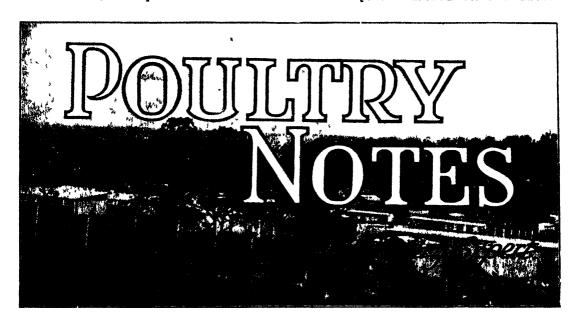
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#### RAISING AUTUMN COCKERELS.

AT a meeting of the Table Poultry Council held a few months ago representatives of the dressed poultry trade expressed concern at the shortage of market cockerels, and stated that there were indications that insufficient birds would be available to meet the demand; also that high prices could be expected to rule for some time to come. In view of this they suggested that poultry farmers should be encouraged to raise more market birds to meet the demand.

However the matter is one of economics and if good prices are maintained this will result in a greater number of cockerels being raised next autumn. Since the meeting referred to, prices have fluctuated somewhat, but are still above the average for good quality cockerels and hens. Whether these prices will be maintained after Christmas remains to be seen, and this will be the main factor in deciding whether it is worth while concentrating upon the production of table birds in the autumn.

There is usually a shortage of prime cockerels between May and September, and while it is not likely that there will be such an acute shortage next year as existed during that period this year, there should be a ready demand. Those who have suitable facilities for raising cockerels early in the year might give consideration to the matter, having regard to market position at the time No attempt should be made, however, to raise autumn chickens where they would have to be run over ground which has been contaminated by constant stocking, or if conditions do not permit of the pens being cleaned up and spelled for several months before the spring chickens are placed in them.

Thus where it is proposed to rear autumn cluckens they should be hatched between the middle of January and the middle of March. Well reared birds hatched during that period will usually realise good prices when 3<sup>1</sup>2 to 4<sup>1</sup>/<sub>2</sub> months old, and sometime even at a younger age.

#### Factors Affecting Autumn Hatching.

It is probable that those who depend upon purchasing day-old cockerels will have difficulty in securing supplies, as only a limited number of hatcheries usually cater for this trade—and owing to labour difficulties there may be less this coming season. In any case, most hatcheries will not sell the cockerels separately, as the demand for autumnhatched pullets is limited compared with that for those produced in the spring. However, except for the cost there is nothing against raising both sexes for the market.

The alternative to purchasing chickens is to hatch them on the farm, but the shortage of labour and the difficulty of obtaining sufficient suitable eggs are the limiting factors. As far as the eggs are concerned, the earlier a start is made to fill the incubators after Christmas, the better, as with the approach of the moulting season, both the quantity and the quality of the eggs deteriorate, affecting hatching results, so that a lower percentage might be expected than during the normal rearing season.

When penning breeding stock, only mature birds should be selected. The idea of using young pullets and cockerels hatched during last spring should not be entertained, as strong chickens cannot be expected from immature birds; moveover, such pullets would be producing a large percentage of small eggs during the early part of the season. There would be no objection, however, to using birds hatched during April or May last.

The male birds require to be in good condition; hence they must be kept apart from the hens for some weeks before being placed in the breeding pens. More care than usual should be given them, and they should be treated for body lice before being placed in the pens; also once or twice during the season, if necessary. It is advisable to give the males an extra feed, preferably of maize, during the day, and as in most cases they will be with flocks of hens, the best means of doing this is to nail a few small tins on the walls of the pens at a height which will enable the males, but not the hens, to reach the feed.

#### The Costs of Production.

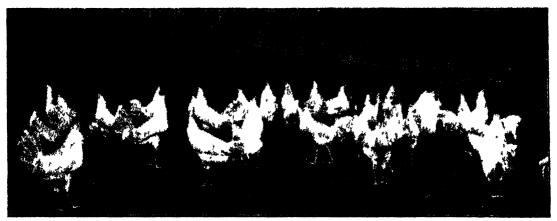
In a review of the figures showing the present cost of egg production, which were published in the October issue of these "Notes," the Chairman of the Egg Marketing Board, Mr. R. C. Blake, draws the conclusion that, according to the figures quoted, the average price of eggs would require to be over 15. 7d. per dozen when feeding costs exceeded 7s. 9d. per annum This is quite correct, provided that the basic wage remains the same. A further statement by Mr Blake that "on these figures, poultry

farming over a period of thirty years could not have been profitable, yet the industry has grown rapidly in that time," is not justified, however, for over a number of years during that period the average gross price was in excess of 1s 7d. per dozen, and, although feeding costs were higher then than 7s. 9d in some years, the higher average egg prices more than made up the difference.

The is 7.268d per dozen for eggs mentioned in the estimate, was the gross return



Well-grown Autumn Cockerels (4) Months Old) Ready for Market.



Prime White Leghorn Cockerels of the Same Age.

necessary to allow for the present basic wage and other legitimate charges. In the published figures allowance was made for interest on capital, and depreciation on plant amounting to £79, and for payment of the present basic wage of £4 14s. od. per week, which together constitute £323 8s. od of the cost shown. No one will claim that the poultry farmer is not entitled to charge interest on the money invested and allow for depreciation. As a matter of fact, in many cases the farmer has to meet interest on mortgage—probably at a higher rate than that shown.

Over the leanest years, however, most poultry farmers have had to forego interest on the capital invested, and have not been able to make any provision for depreciation on plant and equipment, with the result that they have not been able to carry out necessary repairs.

The climax came last year when the return over cost of feeding fell to 4s. per hen. This left practically nothing for living expenses in cases where interest charges had to be met, and the result was an exodus from the industry. Those who were in the fortunate position of owning their farms, or whose produce merchants had sufficient faith in them to allow extended credit, were better able to withstand such a disastrous year, but in many cases farmers had to seek other employment to keep their farms going.

#### Last Year's Returns.

An estimate of expenditure and income last year, on a farm of one thousand layers, leaving out the basic wage and interest and

depreciation, will show the amount on which the poultry farmer had to exist. Several other recent years were little better. The figures are as follows:—

Figures for 1941-42			
hxpenditure—	Ĺ	s.	d.
Cost of feeding 1,000 layers  @ 8s. per head  Feed and fuel to raise 600	400	o	o
pullets to productive age @ 2s. 2½d. each Municipal or Shire rates and water rates and excess	66	5	o
water	25	o	o
nation, etc Marketing costs (freight or cartage, pool deductions,	15	O	O
commission, etc.)	150	O	O
	£656	5	o
Income-			
12,000 dozen eggs @ 19 3d.			
per dozen Less expenditure	750 656	v	0
Less expenditure	656	5	0
Retuin	£93	15	0

There is no denying that the industry has been on the bread-line for the greater part of eleven years (undoubtedly beyond the control of the Egg Board), and that it is long overdue for a more prosperous era. The fact that production has greatly increased in recent years is not so much due

to greater numbers taking up poultry farming, as to the larger flocks rendered necessary by low returns.

#### Prospects for Season 1942-43.

This year, judging by prices ruling so far, the average gross return per dozen will be about 1s. 7d., which will allow poultry farmers a decent living in conformity with Australian conditions, but it must be borne in mind that in many instances debts incurred over past years have to be met; thus a series of good years is necessary to enable proper rehabilitation.

The accompanying statement shows an estimate of expenditure and income, excluding the basic wage and interest and depreciation, calculated on the same basis as the figures for last year and on the assumption that the gross return to the farmer will equal the 1s. 7.268d. per dozen shown as the cost of production.

If this figure is realised the farmer will receive the basic wage, and an amount of £79 shown in the original estimate for interest and depreciation.

These estimates are all based upon an average production of twelve dozen eggs per hen per annum, and, of course, any

producer getting a higher average or selling his eggs to better advantage as a producer agent would show a greater return.

1942-43 Figures.			
Expenditure—	£	s.	d.
Cost of feeding 1,000 layers @7s. 9d. per head Feed and fuel to raise 600	3 <sup>8</sup> 7	10	0
pullets to productive age @ 2s. 1d. each  Municipal and Shire rates and water rates and excess	62	10	0
water	25	0	0
tion, etc Marketing costs, freight or cartage, pool deductions,	15	0	O
etc	150	0	0
	£640	0	0
Income-			
12,000 dozen eggs @ 15. 7.268d. per dozen	963	8	O
	640		
Return	£323	8	0

### Abortion-free Herds.

THE following herds have been declared free of contagious abortion (Bang's disease) in accordance with the requirements of the scheme of certifying herds abortion-free:—

Owner and Address.	Number in herd.		Number in herd.
Bathurst Experiment Farm (Ayrshires)  Bauerle, P. A., Holbrook  Bush, W., Ben Lomond  Callan Parh, Mental Hospital (Aberdeen Angus)  Carrick, G., "Clonlea," Central Tilba  Cowra Experiment Farm (Ayrshires)  Department of Education—Farm Home for Boys,  Gosford  Dixson, R. C., "Elwatan," Castle Hill  East, N., Gum Flat Road, Inverell  Edwards, G. M., "Rothwick," Uralla (Jerseys)  Fairbridge Farm School, Molong  Farrer Memorial Agricultural High School, Nemingha  Forster and Sons, Abington, Armidale (Jerseys)  Forster, N. L., Abington, Armidale (Aberdeen-Angus)  Grafton Experiment Farm (Australian Illawara Shorthorn)  Hawkesbury Agricultural College, Richmond (Jerseys)  Hicks A. A., Estate, Culcairn  Hill, E. Pritchard, Bowling Alley Pt. (Jerseys)  Hordern, E. D., Cabramatta (A.I.S.)  Hurlstone Agricultural High School, Glenfield  Killen, E. L., "Pine Park," Mumbil  Leitch, J. F., "Tumbridge," Merriwa (Aberdeen-Angus)	37 71 30 24 43 4 93 35 205 188 93 108 52 100 95 39	McEachern, H., Tarcutta (Red Poll) Martin Bros., "Narcoma," Urana-road, Wagga Morisset Mental Hospital Navua Ltd., Grose Wold, via Richmond (Jerseys) New England Experiment Farm, Glen Innes (Jerseys) New England Experiment Farm, Glen Innes (Jerseys) New England University College, Armidale Peci River Land and Mineral Co., Tamworth Reid, G. T., "Narrangullen," Yass Robertson, D. H., Scone Rydalmere Mental Hospital, Rydalmere Salway, A. E., Cobargo Skinner, D. S., "Wyworrie," Ben Lomond Smith, Jas. C., Ben Lomond Smith, Jas. C., Ben Lomond Stewart, Sir Frederick, "St. Cloud Stud," Spurway- street, Dundas Trangie Experiment Farm, Trangie Wagga Experiment Farm, Bomen, N.S.W. Walker, Jas. R., "Strathdoon," Wolseley Park White, F. J., and Sons, Bald Blair, Guyra (Aberdeen- Angus) Williams, Chas., Ben Lomond Young, A. H., "Rock Lynn," Cudal (Polled Beef Short- horns)	125 80 132 97 182 171 82 171 82 171 83 85 81 32 197



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# AGRICULTURAL GAZETTE

OI

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VOL. LIII.

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Minister for Agriculture and Forests

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